A Database Publication

THE MICRO USER

Volume 8 Number 9 November 1990 £1.50

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Revealed: The high speed heart of the A540

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Making the Electron process data faster

DANGER DOG
Escaping the ghouls in arcade adventure

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(RISC OS) New

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(RISC OS) New

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(RISC OS) New

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(RISC OS) New

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(RISC OS) New

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(RISC OS) New

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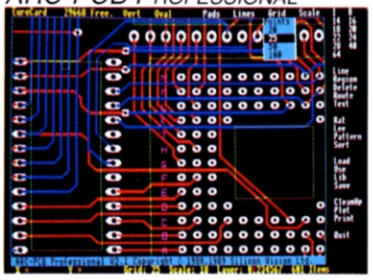

The ultimate PCB design package developed specifically for the Archimedes is now even better. ARC-PCB Professional follows on the success of the original and provides Faster & Improved Automatic Routing, Oval & Circular pads with fully variable sizes, Faster Redraw, Extended library part manipulation, & Instant Editing operations for substantially increased productivity. This Professional version operates orders of magnitude faster than the original and surpasses all other PC-based PCB design systems in features & speed of operation for the fastest turnaround from concept to finished board design. Take the lead for your PCB designs before your competitors do.

(RISC OS) New

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(RISC OS) New

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- **The Micro User:** Mike Cook will be available to help and advise on BBC/Master related matters.
- **Gordon Taylor:** The renown Archi 'Guru' and technical writer will be available to advise on Archimedes related matters.
- **Acorn Computer's** representitives will talk about proposed new products and answer all yours questions.

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Reviews Coordinator **Pam Turnbull**

Group Advertisement Manager **John Snowden**

Advertising Sales **Peter Babbage**
Yvonne Benson

Tel: 0625 878888 (All depts.)
051-357 2961 (Subs.)
MicroLink: MAG001
Telex: 94081191
Prestel Mailbox: 614568383
Fax: 0625 879966

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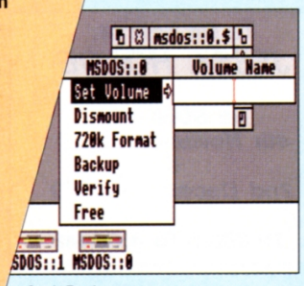
BUSINESS SPECIAL

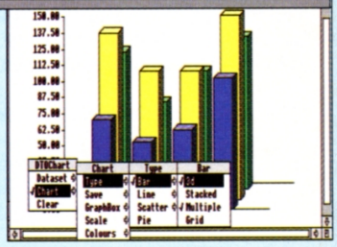
40 **Cash Book**
Use this excellent utility to keep track of your petty cash or daily accounts easily and accurately

43 **DeskTop Office**
A new five-in-one package that provides the basic components for running your office



Cash Book

DeskTop Office



51 **PC Access**
Discover how easy it is to transfer data to and from the PC world with this simple application

129 **Wordwise Database**
How to use a wordprocessor to build and maintain a complex database with ease *

Type-it-in

This symbol indicates that the feature contains at least one full length listing for you to key in on your micro. *

All the major listings in this magazine are accompanied by checksums to help you key them in correctly. For full details of how to use them see the article on page 72 of the February issue.

Get it right ✓

MICRO USER CLASSIFIEDS

The best bargains in the world of all Acorn micros come from fellow readers of The Micro User. Turn to Page 123 to find just what you're looking for – from cheap modems to complete computer systems.

Newcomers

89 **Universal Synthesiser**
Check out this add-on from Hybrid that makes music better than the Master's sound chip.

99 **Speakeasy**
The world of computer speech has now been enhanced another stage – we take a look.

118 **Linkages**
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121 **A540**
Acorn's new super-micro has an innocent exterior – we reveal its turbo-charged heart.

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20 **Adventure Postscript**
What are the educational benefits of organising an adventure game for schools by Email?

22 **Education Reviews**
We look at the latest software for the BBC Micro series in schools including:

- Nstore
- Connections

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INTERDICTOR

In this special feature we reveal how Interdictor was created and interview the experts who designed it and its brilliant successor – Interdictor II. Plus a really useful guide from an experienced player on how to succeed – and land – at the controls of this remarkable simulation

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28 **Shorts**
Get to grips with π with three ways of calculating this irrational number

47 **Danger Dog**
Try your hand at this terrific arcade adventure and help the Danger Dog

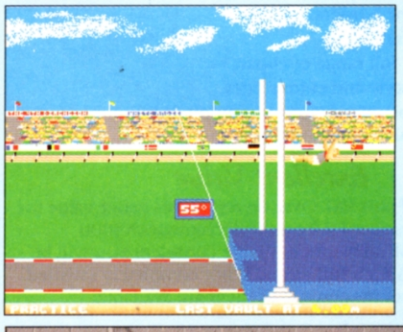
63 **Extended Palette**
Bring a wealth of new colours to your BBC Micro using this new technique

75 **Programming Style**
Does your software need a kick in the interface? Find out how to make it friendlier to use.

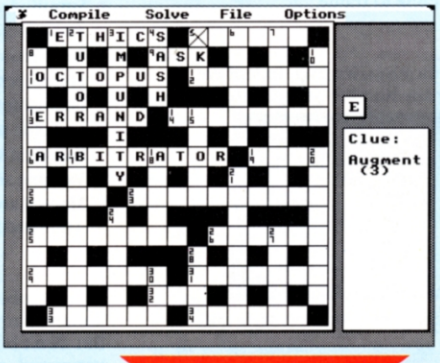
78 **Supercharged Electron**
It is possible to speed up your Electron using just software – we reveal all.

115 **Routine Matters**
Another batch of fascinating utilities that you can include in your own programs

94 **Our reviewers delve deep into the depths of the latest games releases.**



Olympics



Xword

SOFTWARE SCENE

Nevyron

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FREE Software

Subscribers to *The Micro User* will receive the following software on disc or tape wth this month's magazine:

- Danger Dog
- Faster Electron
- Extended Palette
- Routine Matters

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- !SparkPlug
- !GIF
- Pictures
- Demos

For new subscribers there's a special gift: A free binder to keep your copies of The Micro User.

Find out how to subscribe on Page 125.

Key to which micro articles are suitable for

- Electron
- BBC B
- BBC B+
- Master 128
- Master Compact
- Archimedes series and BBC A3000

THE MICRO USER

Lazy Days

As Christmas approaches we take a look at the more leisurely side of life in our next very special issue. Including the ultimate cheat for the ultimate arcade adventure: Exile. Not forgetting all our regular features plus the money-saving PD section

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Frame Handling

Ovation has many advanced frame features, such as linked text frames with auto-flow, repel text, definable frame borders and a step-and-repeat facility. Unique on the Archimedes, is our parent/child system for frames and lines. This system allows you to copy and paste frames with embedded child frames and lines, as single items. This allows diagrams, forms, tables etc. to be copied or moved with ease.

The Instinctive DTP

Ovation is supplied with a tutorial and complete user guide, although you probably won't need to refer to it very often. Ovation makes full use of the RISC OS multi-tasking environment to provide a formidable array of features that are easy to learn and instinctive to use. A quick reference card is also included, which lists all the keyboard and mouse short cuts.

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News BEAT

Acorn are taking the leisure trail

ACORN are making a strong bid to move away from their traditional education market through a new project with major distributors ZCL. The result of this collaboration is The Jet Set Pack, which is based on the BBC A3000 micro and is aimed squarely at leisure and home users.

Better known as Commodore and Amstrad distributors, ZCL were taken on board by Acorn earlier in the year and have brought their wealth of leisure market expertise to the Jet Set project.

They have provided the vital component of a reliable and cheap TV modulator which has been something lacking in Acorn's attempts to crack the home market. The ZCL adaptor offers monitor quality and has been given Acorn's full seal of approval.

The Jet Set Pack put together by ZCL includes an A3000 complete with support discs, manual and mouse, the TV adaptor and an impressive array of software.

As an integral part of the Jet Set theme, Clare's Interdictor flight simulator is the star package (*see Page 31*). It is backed by Domark's Trivial Pursuit, Ace's Euclid, Superior Software's Superior Golf and the utilities Paint, Draw, Edit and Maestro from AcornSoft.

Aimed at the Christmas market, they come in an eye–catching full colour box with a recommended retail price of £650 plus VAT – an attractive bargain when compared with the current £819 plus VAT price tag of an A3000 with monitor.

"Acorn sought an association with ZCL because as a distributor, we are trade only", said ZCL's chairman Don Carter.

"Firstly we only deal with independent retailers and secondly, we provide a wealth of experience in the leisure and home computer market.

"What Acorn needed for the home market was a modulator and we have spent the last few months sourcing and evaluating various ones. We have now found one which produces monitor-quality pictures".

ZCL's philosophy on which The Jet Set Pack is based is that concerned parents may want to buy an educational machine for Christmas while their children will want something which sounds like more fun.

If they buy the pack, the children will be happy with Interdictor and the other software and when their interest wanes, the family will still have a machine for legitimate educational use.

"We will not be selling to multiples", added Don Carter. "We will only deal with independent retailers who will be able to support the project with ongoing educational software.

"We believe we will get a lot of business with The Jet Set Pack. Parents will have an ideal workhorse for educational programs; children will get the games they want; the Acorn user base will be extended and this will encourage developers to support the machine with more leisure software at a reasonable price.

"It's a situation where everyone wins".

Convertor gives Arc borrowed sound

DUE soon from The Serial Port (0243 531194) is Tracker, a useful convertor program which allows Archimedes owners to make use of sound tracker music produced on the Commodore Amiga.

Just awaiting the finishing touches to its manual, Tracker features an editor written by The Serial Port and allows Archimedes users to include sound tracker music in their own programs. It includes 200 instruments and will cost £49.95. Also new from The Serial Port is their Joystick Interface which sits on the Archimedes' parallel printer port with a switch to change from printer to joystick and back.

As well as the normal up, down, left, right and fire actions, it includes a swivel movement which can make the joystick a mouse alternative for desktop use. The interface costs £23.95, including software which gives the unit its own emulation code.

Under their Eclipse label, The Serial Port have announced Blowpipe, a horizontally scrolling space shoot-'em-up with five levels. It features well defined attack waves and allows the player to collect credits with which to purchase more weaponry.

Due in the shops soon, Blowpipe is for Archimedes machines and costs £19.95.

Andrew Foyle of The Serial Port reports major problems with the initial version of Worldscape – the Archimedes package which challenges users to create a whole world while keeping in mind the problems of ozone layers, rain forests, temperatures and conservation of natural resources.

"The programmers are now sorting out these problems and I am hoping that Worldscape will be in the shops in one or two months time", he said.

When it does hit the market, Worldscape will sold under the Eclipse label and will cost £19.95.

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Educational sweetener

THE ladies with big hats, PC Arthur Smith and Betty Bailey the Post Office lady are just some of the amusing characters awaiting children who visit Honeypot, a village in the valley of Cloudsly.

They can take the trip thanks to Resource, the education consortium supported by the LEAs of Barnsley, Doncaster, Humberside, Rotherham and Sheffield.

Due out soon, their latest release, Honeypot, comes with a full-colour A3 picture book and is designed to cover a wide number of technology activities for primary school pupils.

Children scroll through the village and its surroundings reading or listening to the accompanying stories while learning such skills as planning, designing and making. Honeypot comes with a 40 page teachers' guide which contains photocopiable worksheets, activities and a host of cross-curricular extensions. The price is £44.95.

Also new from Resource (0302 340331) is CASS, a Curricular Analysis Support System – a suite of programs which allows teachers to analyse classroom experiences in terms of Statements of Attainment.

CASS will record the dates of a child's achievements and so allow the teacher to see the contexts in which the child learns best. It will produce a range of easily interpreted records in graph, grid or report form which can be used to modify future plans for individual children.

To be available soon, CASS comes on a double sided 80 track disc and runs on the Master. A classroom pack costs £29.95.

The popular Resource maths package Dust has now been launched in an Archimedes and BBC A3000 version. Aimed at upper primary and lower secondary pupils, this adventure through space prompts children to discuss mathematical concepts and solve a variety of problems. Price, £30.50 or £22.50 if 10 or more copies are bought.

Seeing the big picture

The bright lights of London

IMAGINE an Archimedes screen measuring 12 feet by 20. That is virtually what Londoners are seeing with the latest award-winning posters masterminded for London Electricity Board by Broad Street Advertising.

Surprisingly, the huge 48 sheet posters of London by night which are gracing hoardings throughout the capital did not originate from an Apple Mac, a Quantel Paintbox or a Barco Creator. Work on them was done on an Archimedes at the Suffolk headquarters of Pixel Graphics. Anthony Matthews of Pixel Graphics started with a picture of Big Ben in primary colours.

It was captured using a video camera and colour was added using Pro-Artisan software. Screen shots were taken and made into transparencies.

Cleverly, Broad Street's Paul Giradot steered away from clearcut images.

"When the transparencies were enlarged they retained the rougher lines of the original computer screen shot and also the phosphor dots of the screen to give the final result a true feel of the city at night. People just cannot believe that these posters are really just screen shots", said Anthony Matthews, "and because of the shape of the posters, they are shots of only part of the computer screen".

Pixel Graphics have been in existence for 18 months and started life as a design house for greetings cards. The LEB job is a major breakthrough.

Having been tempted to use a Mac, Anthony has remained with his Archimedes. "The real bonus is that having come up through using a BBC B, I can write my own Archimedes programs to fill in the things I want to do that Pro Artisan and other packages don't do. I can write my own stuff to manipulate images in just the way I want", he said.

The LEB poster recently received mention in the Hot Shots section of XYZ magazine, the mouthpiece of the professional DTP world.

Arcades also ran

THANKS to a major and unusual licensing coup, Electron and BBC Micro owners will soon get the drop on the coin–op fraternity.

Audiogenic (081-861 1166) have upended the normal licensing routine and are to bring out the micro versions of their new puzzle game Loopz months before it appears in the arcades.

Normally publishers of home computer software buy licences from coin-op companies, but Audiogenic has switched this by selling the worldwide coin-op licence for Loopz to Capcom USA of Santa Clara, California, the American subsidiary of the major Japanese manufacturer.

Only a handful of computer games have found their way on to coin-op, the first being Choplifter in the eighties and the most famous being Tetris.

The coin-op version of Loopz is not expected to appear in arcades until 1991 but Electron and BBC Micros versions are imminent. The game involves making loopz using pieces that appear one at a time and is Audiogenic's first game to reach the arcade.

Loopz costs £10.99 on cassette, £14.99 on disc and there are plans to bring out an Archimedes version.

Loopz has also been licensed to Barcrest, the pub machine subsidiary of brewers Bass Charrington and will be adapted for their Skill-With-Prizes pub machines.

Also imminent from Audiogenic is the launch of Electron and BBC Micro versions of Emlyn Hughes Arcade Quiz. It includes six categories of questions. Price £10.00 on cassette; £14.99 on disc.

Musical tutorial

NEW users of Hybrid Technology's Music 5000 system for BBC Micros can now learn how to get the best out of the system through a new book published by JB Software (0933 675392).

The step-by-step tutorial progresses from a beginners' session through subjects such as note timing, phrasing and dynamics to advanced issues including musical arrangement and orchestration.

Each subject is clarified by musical examples and utilities on a companion disc, ready to play on the system.

"There are many ways to achieve the same results on the Music 5000", said author John Bartlett. "With this in mind, the methods I have described in the book are the ones which I use and have found successful. I hope they will prove invaluable to any user who wants to create natural-sounding muscial performances on their computer".

John is a long-time Hybrid Music System composer and author of three albums.

The book, Play – The Performance Tutor for the Music 5000, is available in printed form for £15.95 or as self-printing text files on disc for £11.95. Both versions include the example files disc.

Compact Fun School 2

After record sales of 160,000, Fun School 2 is now available on 3.5" disc for the Master Compact.

It's available direct from Database Software at Europa House, Adlington Park, Macclesfield SK10 4NP or by telephone 0625 859333.

The price of each set of eight programs is £12.95.

BLOWPIPE

Five levels of alien warfare lie before you – the most devilishly ingenious terra incognita you have ever faced awaits you, determined to question your genius and cause your downfall – can you keep ahead of this masterpiece of technical wizardry – conquer hitherto uncharted, undreamed of heights?

At the controls of the top specification ship, **The Annihilator**, you must establish a strategy to survive each level and collect as many credits as possible to use in the trading posts en route where you can equip your ship with even more powerful weaponry.

At the end of each stage, a fiendishly gruesome arch-guardian will try to check your progress through the portal to the next level – get it before it gets you and revel in your cunning.

Blowpipe is a masterpiece of Archimedes games' coding with over 2.5 megabytes of 256 colour graphics with up to 64 sprites on screen simultaneously. Over fifteen separate pieces of 4 channel stereo music with stunningly realistic sound effects heighten the excitement – explosive, mind-blowing, meteoric mega-action, all compressed onto just two discs.

WORLDSCAPE

Can you rectify world devastation? **Worldscape** affords you the opportunity to try, combining man's knowledge with your own ingenuity.

The fine balance of the planet Earth has been maintained by natural phenomena however catastrophic – volcanic eruption, earthquakes, tidal waves, plagues – but crucially, in the three hundred years since the Industrial Revolution, the human race has caused the global problems facing us today:

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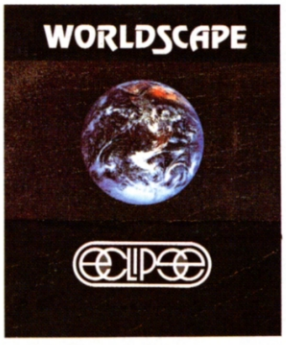
Can you improve on present-day thinking? **Worldscape** gives you the opportunity to try – use its built-in landscape generator to create totally unique landscapes – build cities, erect power stations, deal with sewage, plant your own forests – these and countless other options are available to you.

Remember you hold the advantage over scientists in the real world – you can correct your errors – mankind rarely can.



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Access

Clotted cream and software

DEVON has now become one of the most active sources of new software thanks to Minerva (0392 437756). The Exeter-based company has added to its impressive development record with two more packages.

FlexiFile is a powerful multi-tasking database which allows multiple files to be opened at the same time with relational linking between any two files.

With friendly screen displays, it enables fast sorts to be carried out and through its soundex searching allows mis-spelt items to be found.

Flexibility is the watchword for this package which includes simple mathematics and indices for files to be browsed in more than one order without sorts.

Flexifile will produce reports with headings and totals and also integrates with graph packages such as GraphBox.

An auto-dial facility allows users to tone dial numbers stored in files and the package comes with back-up documentation including a disc-based tutorial. It is available for Archimedes and A3000 machines and costs £149.95. Also new from Minerva is Business Accounts, a set of individual modules which can be bought separately or integrated as a full suite. They cover stock management, order processing and invoicing, nominal, sales and purchase ledgers.

It allows for full stock analysis, the preparation of multiple statements, archiving for mail shots and definable invoice layouts. The package, for Archimedes machines, costs £399 for the full suite or £99 per module.

Hat-trick for Watford

WATFORD Electronics (0923 50335) have scooped the Panasonic Printers Premier Dealer Award for the third year in succession. The company have gained top honours every year since the awards were established.

Nazir Jessa received the plaque from Deputy Managing Director of Panasonic UK Terry Ngai at a ceremony held in the Hilton Hotel, Newport. He was also invited to tour the Newport Panasonic headquarters.

"I am very pleased and satisfied with this award, especially since the market has taken a downward trend in recent months", said Mr. Jessa.

"Even in the present climate our sales have remained constant and in fact the turnover this summer was slightly better than for last Summer".

Visitors to the previous open days at Watford will be pleased to know that two more dates have been set.

The company will be opening its doors again on Sunday, November 4 and Sunday December 2 from 10am to 4pm.

As with previous events, staff of *The Micro User* will be on hand to offer advice and meet their readers; Watford staff will be out in force to offer advice and will be joined by many of the software and hardware companies which support the Acorn market.

Education will feature strongly on both days following the great interest shown at previous events by parents, teachers and Local Education Authority representatives.

Snippet snapped up

WHEN 4Mation boss Mike Matson turned up at the recent Acorn User Show he took an interest in the offer of public domain programs being made by Acorn User magazine. His interest turned to amazement when he realised that his own frame grabbing program Snippet was being doled out as part of the deal.

"People were handing over £1 and receiving in return a number of public domain programs off the hard disc. One of those being handed out was Snippet, until I pounced", he told *The Micro User*. "This was being done by a junior member of staff and I am now prepared to accept that it was not being done wilfully. He thought it was public domain.

"The matter has now been sorted out amicably, but it should act as a warning to other people that this sort of thing can happen, even though it was apparently done innocently".

Snippet was written by New Zealander Carl Ansley who is one of the young team of Kiwi developers now working for 4Mation and recently featured in *The Micro User*.

Carl and his fellow programmers from down under, Dave Caughley, Paul Le Beau and Rob McKay, are coming to this country in January to visit the Bett Show and to have their first look at the computer scene for which they have been writing over recent months.

High-flying contestants

Formula First driver, David Shepherdson

THREE major software houses supported *The Micro User* with excellent prizes for our birthday competition in March.

Following the theme of their superb flight simulation Interdictor, Clares Micro Systems donated a prize of flying lessons. Lucky winners R.Gayton of Allerton and F.W.Nevin of Crawbrook duly took to the skies.

E-Type developers 4th Dimension sponsored Geoff Taylor of Ackworth, James Pearson of Cambridge, S. Mansfield of Margate and D.Shepherdson from Ilkley to try out their skills as Formula First racing drivers. Rounding off the winners, Ewen Roberts from Littlethorpe received a full-sized bar football table from Superior Software.

Come to the fair

CAMBRIDGE International Software (071-833 4023) are to hold an Archimedes Autumn Fair at their headquarters, 8 Herbrand Street, London on October 27 and 28 from 10am to 6pm each day.

Exhibitors at this latest in the popular series of Archimedes-specific shows will include Dabs Press, Minerva, Apricote Studios, Superior Software, Arxe, Brainsoft and many more supporters of the Archimedes market.

New from CIS is their Minipack 5 compilation. It includes the Magnetic Scrolls game Fish, CIS' own Fireball II and Pon from RTFM and costs £29.95. Also now available is CIS Utilities which includes SAFE! Pro Copier v2.1 and Compedit for a price of £11.95.

Safe from surges

NEW from Bowthorpe EMP (0273 692591) is the Tranquel surge protection plug incorporating a neon indicator which glows when the power is on and the earth connection is present. The plug diverts surges harmlessly away from both operator and associated electronic equipment.

In a flame-retardant housing, Tranquel incorporates WAGO colour coded screwless connectors for wiring and three-mode hybrid protections circuit to reduce high energy surges and withstand over-voltages caused by lightning. Price, £27.60.

Acorn giveaway at Shopper Show

AN added bonus awaits visitors to the Acorn Conference at this year's Computer Shopper Show. In addition to an impressive line-up of speakers and two market debuts, they will be offered vouchers worth thousands of pounds to spend with Acorn exhibitors at the show.

On each of the four days of the conference, everyone attending will be handed vouchers which can be redeemed against Acorn goods in the exhibition. People attending on more than one day will receive extra vouchers for each day they attend.

As reported in last month's *Micro User*, Genesis 2 from Software Solutions will have its first public showing at the conference. Also to be seen for the first time will be a new insight into improved emulation under Risc OS using the file transfer system recently launched by Acorn.

It will be given by Ian Lynch, an operating systems expert who is curriculum development director for the City Technology Colleges Trust. His topic PC Emulating will show how to move data between more than one operating system and will cover the standards of MS Dos, Unix, Risc OS and BBC.

Other top names from the Acorn world have been added to the conference line-up since last month's report. Technical Director of Aleph 1 Alex Van Someren will look at the expansions available for Archimedes machines; managing director of Next Technology Graham Brown-Martin will demonstrate CD Rom in Education and Malcolm Colledge will speak on Image Processing.

He is a member of the Salford College of Technology team which pioneered The Biomechanics Workstation.

"With speakers of such a high calibre, the conference will be a must for Computer Shopper Show visitors who want to learn of latest developments in the computer world", said Acorn's consumer marketing manager Simon Lovesey.

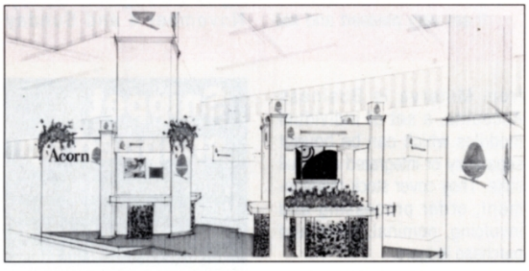
"They will have a unique opportunity to see technological innovations put through their paces by what we believe is the most impressive line-up of experts to be assembled for an exhibition of this kind.

"Backed by the support of Acorn's leading third-party suppliers and our discount voucher offer for conference delegates, it will be of both practical and valuable help to Acorn users attending this important pre-Christmas show".

Delegates can register for the conference by completeing the coupon on Page 55 or at the Acorn stand during the show.

The Computer Shopper Show takes place from December 6 to 9 at Wembley Conference Centre.

Admission for adults is £5; children under 16, £3.50 with £1 off for advance tickets and a pre-paid family ticket available at £12 for two adults and two children. Ring 051-357 1736 for credit card bookings.



Acorn Conference Timetable

Thursday December 6 and Friday December 7	
11am to 11.50am	CD Rom in education
12noon to 12.50pm	Schema – A spreadsheet for the family
1pm to 1.50pm	Image processing
2pm to 2.50pm	PC emulating and other operating systems
3am to 3.50pm	Music Midi mania
4pm to 4.50pm	Risc technology in the 1990s
5pm to 5.50pm	Desktop publishing
Saturday December 8 and Sundar December 9	
11am to 11.50pm	Hypermedia for all
12noon to 12.50pm	Schema – A spreadsheet for the family
1pm to 1.50pm	Programming made easy with Basic 5
2pm to 2.50pm	PC emulating and other operating systems
3pm to 3.50pm	Music Midi mania
4pm to 4.50pm	Faster computing
5pm to 5.50pm	Designing documents

Euclidian ray tracing

ARCHIMEDES owners can now generate whole animations in less than an hour with Arclight, the latest graphics package from Ace Computing (0223 322559).

It's a fast, multi-tasking ray tracing package for users of 3D program Euclid.

Arclight uses ray tracing to produce high quality 3D pictures similar in quality to the graphics seen on TV, its realism being achieved by the accuracy with which light shadows and reflections are represented.

It is very fast, producing complex images in a fraction of the time normally taken. The speed is achieved using oct-trees, a sub-division method which enables the program to simplify the scene it is working on by dividing it into voxels – smaller, manageable boxes.

Arclight can work in the background, leaving the computer free to perform other tasks.

All existing Euclid pictures can be ray traced and the resulting Sprite files imported into most leading DTP and art packages. The program automatically compresses frames into an Ace Film format which can be used with the public domain Projector application. Price, £50.

Teaching new technology

COMPUTERS are valuable in giving physically handicapped people or those with learning difficulties a better standard of life. E.A.S.T. (Education And Social work Training) now helps the disabled, their carers and teachers to get more out of new technology.

E.A.S.T. staff undertake training courses throughout Scotland and the UK. Through these courses and consultancy, they also aim to help shape future policies on IT training for the disabled.

They have extensive experience in the use of computers in a variety of settings and have detailed technical skills at their disposal. Staff are also very experienced in putting their knowledge across whether to people who are complete beginners in computers or those who are more experienced.

Courses include Computers for Beginners, Adult Basic Education, Switch Control, Remedial Education, Communication and Evaluation. They are held for individuals or groups. More details can be obtained from E.A.S.T. on 031-669 3916.

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A3K2

When you are ready to expand the A3000 this ***system housing*** is added, allowing upto 2 floppy drives and a hard drive to be added.

A3K3

If you are adding an expansion card (podule) to an A3000, such as a hard disc card, then you will need this ***podule case*** to connect & protect the card.

A3K6

If extra floppy drives are to be connected then you will require a ***disc buffer.*** This one supports upto 3 additional drives and incorporates software control for physical to logical drive mapping & 40/80 stepping which could prove essential when using discs in 65Host or PC emulator. A key feature is the built in expansion for further cards to be added internally; also see A3K12. NB some cheaper products may only provide a connection for an additional drive without buffering.

A3K7

A 20 mb hard disc drive ready to fit in A3K2, including the hard disc card and all cabling. We are not aware of any other hard disc upgrade that is treated as an internal upgrade (consult your Acorn dealer or call PRES for details)

A3K8

3½" disc drive & mounting brackets for A3K2

A3K9

5¼" disc drive & mounting brackets for A3K2

A3K12

A ROM & disc upgrade for A3K6 provides –
1) a desktop ***DFS filer*** that allows DFS files to be dragged to ADFS viewers or straight into applications such as Edit or Pipedream.
2) BBC ***1770 DFS*** for use in ***65 Host.*** Automatic Icon and loader which can allow BBC DFS discs to have **<SHIFT BREAK>** operation.
"effectively turns your A3000 into a model B" Acorn User Sept '90

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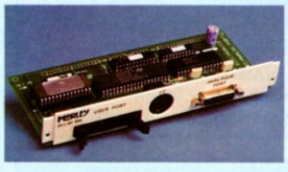

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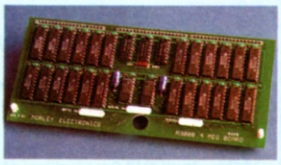

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The LaserDirect consists of an interface board, our RISC OS printer driver software, and a special version of the 300 dpi Qume six page per minute printer. Because the board drives the printer 'engine' directly, not only does this save a complex controller board usually resident in the printer, but it also means it prints very much faster than traditional printers. The speed is a combined result of our optimised RISC OS printer driver, the RISC processor and the unique 2Mbit/second data link to the printer. One other significant advantage is that the LaserDirect uses the Acorn outline fonts installed in the machine, so guaranteeing all fonts seen on screen will print - no need to make sure the fonts match those installed in your PostScript printer.

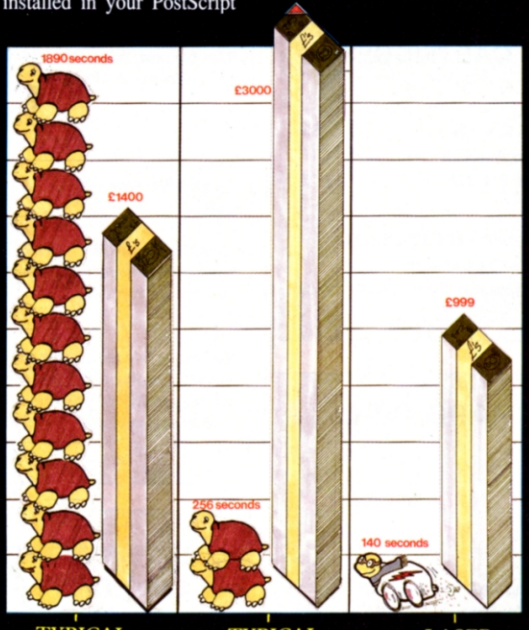
The result is a printer whose quality is the same or better than traditional lasers, that can use all RISC OS outline fonts, that is faster than traditional printers, and costs less.

The Qume Liquid Crystal Printer is not technically a laser printer. Instead of having a laser and spinning mirror arrangement, this printer has a conventional light source shining through a liquid crystal shutter array. The result is fewer moving parts, a lower cost and a more reliable printer. It also occupies a very small amount of desk space—42cm by 42cm, no more than a standard dot-matrix.

Special features - Software on board means it is always available and can be automatically installed on startup - no loading from disc • The LaserDirect offers special links to other Computer Concepts software. For example, when combined with the new Scan-Light Plus software, it offers a direct scan to print facility. It can scan and print a full A4 page in under a minute. • A PostScript compatible interpreter will also be available, turning the Archimedes and LaserDirect printer into a very fast PostScript compatble printer (but using the Acorn outline fonts).

LaserDirect Qume (incl. printer, interface board, and software)
£999 +VAT & carriage

Compatible with all applications that use RISC OS printer drivers, e.g. Draw, Paint, Pipedream, ADP, Impression etc.



Graph shows time taken to print a typical 10 page document with a selection of different fonts, together with typical price.

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UPDATE

Graphics packs

THE history of costume, world wildlife, pre-historic animals and world maps are just some of the subjects covered by the range of graphics libraries from Micro Studio (0353 720433).

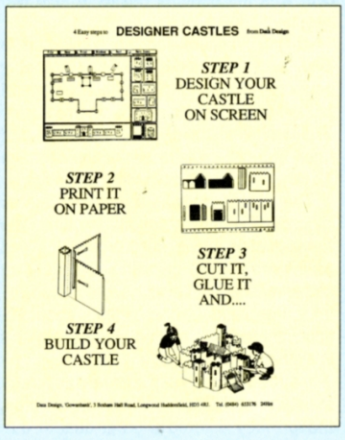
Teachers needing to show their pupils the costumes of by-gone ages can choose from examples as diverse as Egyptian pharaohs, Anglo Saxon warriors, Byzantine emperors and Norman crusaders.

The wildlife pack includes more than 70 animals and birds ranging from the more common kangaroo and giraffe to the unusual caracara, uakari and echidna. More than 20 pre-historic animals and the 20 countries are included in other packs. They are for Archimedes machines and cost £34 per pack.

Designer castles

THE ability to create a design on the computer screen then print it on paper has been carried one step further with Designer Castle from Data Design (0226 249590). With this innovative program, which has now been launched in an Archimedes version, pupils can design a castle on-screen, print it out then actually build it into a model.

The user creates a frontal view of castle walls from the range of sections and towers



offered by the package. Walls are connected and manipulated in plan view to make castle designs of any shape. They are printed out ready to be trimmed, folded and assembled with glue tabs and strengtheners provided.

Extra buildings and working siege weapons are included for added realism and a further pack allows users to build medieval villages. The new Archimedes version includes both castles and villages and costs £79.35. They are available separately for BBC B and Master 128 at £22.95 but need a printware support rom costing £28.69.

If you go down to the woods...

A regiment of Teddy Bears has been enlisted to help in Database Software's £100,000 promotional campaign for Fun School 3, soon to be released for the BBC Micro and Archimedes.

Through in-store competitions organised by selected dealers across the country, youngsters can win a Fun School teddy. Also hammering the Fun School message home are window displays featuring A1-size classroom blackboards and posters plus an ambitious advertising campaign.

"The teddies have become such an integral part of Fun School that our promotions would not have been complete without them", said managing director of Database Software, Chris Payne. "Since Fun School 2 was such a phenomenal success, it was tempting to rest on our laurels but complacency can be a risky luxury".

Managing director, Chris Payne and staff relaxing after a fun day

DTP updated

ESM (0223 65445) have announced the next generation of their schools desktop publishers and wordprocessors which started with the popular BBC Folio. DeskTop Folio for the Archimedes range works on two levels so the teacher can control its complexity for each pupil.

On the more sophisticated level, it is a comprehensive desktop publisher with full Risc OS compatibility allowing pupils to put pre-saved pictures or scanned images as well as text into documents of any design including newspaper style with balancing columns and headers.

Simple Screen Folio retains all the versatility of the higher level but is intended for

younger children or as an easy introduction to the DeskTop level.

To help get children started in DTP, both levels of DeskTop Folio come with a range of fonts, a library of pictures and a choice of stationery layouts.

The standalone price is £103.50 with a primary licence offered for £287.50 and a secondary school licence for £431.25.

Even more universal music

PUPILS now have even wider scope to make high quality stereo music with their BBC Micros thanks to the Hybrid Technology (0223 420360) Music 5000 Universal, now compatible with 70 programs.

The new version also includes a special profile creator to cope with any program for which it does not have stored information and has a software price of £33.35.

In addition, five major BBC Micro music education programs have been enhanced to work with Music 5000. Rhythm Maker from ESP (0602 295019) lets children use either keyboard or mouse to build rhythm patterns on a grid then combine these patterns to make complete rhythm tracks. Price, £24.15.

Compose Play, also from ESP, is an extension of the widely-used Compose program but extends it into three musical parts. Price, £24.15.

The new version of Basic Music Composition from Tobin Music Systems (0279 726625) provides full chords and bass and lets the users arrange the finished song with a choice of 16 instruments and a variety of effects. It costs £19.95.

Level One Theory of Music (Tutorial) and Theory of Music Questions and Exercises are designed for students preparing for music exams and cover all the material needed for grades one to five. They have been adapted to take account of the Music 5000's ability to produce more accurate musical examples than the BBC Micro's own sound system and come from Ted Kirk (0744 818761). They each cost £15.

Lost in time

Michael Gouda reveals how an Email adventure came into being

IN the May issue of *The Micro User* Marshall Anderson described how Bradwell Village School met the mysterious Zorg and rescued two 17th century children from his evil clutches via an electronic mail service.

Although I must own up to being the author of this adventure game, the other end of the story was run by some fifth year pupils of Evesham High School who, with a little help, worked out the story and kept the adventure going for a term.

I became interested in the project after reading about some work done in Derbyshire with live adventuring. Here a school had co-opted an established author to plan out a story and be on hand to keep it going whatever replies were received from the correspondents.

What Derbyshire could do, surely Hereford and Worcestershire could emulate? And over the summer holidays a friend and I worked out a rough draft of a story involving two children, Jason and Emelda, lost in time and suffering from amnesia. Only historical research about their roots would return them home.

It was not necessary to work out all the details at the start as these would depend on the reactions of the target school. Ideally the plot should have been invented by the pupils, but there wasn't enough time, as I wanted to start at the beginning of term.

The Campus 2000 electronic mail network provides an index of all the schools which belong to the system divided into counties and it is interesting to see, by virtue of the number of middle schools, how generous some education authorities are: Hampshire has 103 primary and middle schools subscribing, but others have none.

I chose 10 schools with a pin and three replied, of which Bradwell Village was by far the most enthusiastic. The first message asking for help was sent and lay in wait for any unsuspecting pupils to find.

Meanwhile my group of fifth years – who were doing an Information Technology GCSE course and English – awaited the outcome.

We planned that the tasks should work from the individuals outwards. First there would be easy questions which could be answered merely from picture books: For example, what are the children wearing?

Emelda's reaction to wearing ruffs was a hint about the Roundhead/Cavalier conflict that the Bradwell pupils soon discovered.

Then we asked them about a wider social area – 17th century food, travel, medicine, entertainment, and that got them really researching with a vast quantity of information gleaned from their library.

Eventually we asked about various notables of the time and got them to find out about the political/religious situation which led to the execution of Charles I in 1649 – which, by sheer coincidence, happened to be the year the children had come from.

Although this sounds rather dry and academic, as soon as the pupils became interested in Jason and Emelda's fate they were only too willing to provide as much information as they could in the hope that it would rehabilitate them and take them back to their own time.

They found out about Inigo Jones, William Harvey, Hooke, Boyle and Napier – though they failed to discover the name of Francis Bacon, the Lord Chancellor and the author of New Atlantis – whom Jason's father had supposedly been named after.

Added to this was the character of Zorg – who, incidentally, was not an alien, but a technologically advanced human from the 23rd century who stepped in occasionally to forbid the children doing further research – and so guaranteed to do the opposite!

We had some difficulty making him credible, though a little inside information allowed him to reveal some interesting facts from his database about his chief sceptics.

Educational aims

A primary target, naturally, was the ability to use an electronic mail system. Until this escapade we'd only had some desultory and trivial conversations which hardly justified the enormous subscription costs of Campus 2000.

There was a social value, we thought, in linking a middle school to a secondary – even if the former never really knew who they were talking to. One of the things I was determined to avoid was any tendency to talk down to the juniors.

My authors had to keep in character, as Jason and Emelda were the chronological contemporaries of the Bradwell pupils. Of course they could go to town with Zorg, who on occasions got downright nasty.

The research element was very important on both sides, and if we did it again we might structure it a little better. The middle school pupils found out a vast amount of disparate information which could, perhaps, have been more valuable if better organised. However what really did come over was the genuine desire to help two people in trouble.

At the Evesham end the pupils had to draw on literary skills they had probably never used before. Although the general plot skeleton was there, the answers from Bradwell were hardly ever the expected ones and the lively imaginations of these 12-year-olds tested our brains to the full.

The experience was a valuable one as regards IT where all pupils explored the Email system using word processing and passwords, plus creating and solving coded messages. I also thought it successful in the pupils having to think about fictional character formation and the way this is expressed in language.

I encouraged very formal language structure for the two 17th century children, though they differed a great deal in outlook, while Zorg enthusiastically indulged in some of the worst excesses of the stereotyped teacher – at the same time remembering that he did come from three centuries into the future.

The final defeat of Zorg was met with great rejoicing from the Buckinghamshire end, and Jason and Emelda were whisked back to their own time.

From the replies it was obvious that some of the middle school pupils took these messages from the time travellers with considerably more than a pinch of salt, but there must have been some who, if not actually believing in Jason and Emelda, wanted to.

Here at last...

A beautifully engineered, attractive, fast, A3000 hard disk drive **for only £399 + VAT**

A3000 ST506 Podule & Hard Disk Drive

The Morley ST506 interface for the A3000 has been designed to introduce the A3000 user to the world of hard disk computing at an affordable price but without sacrificing speed or quality.

The ST506 podule is a 16 bit card providing high data transfer rates to and from the A3000. The card and accompanying module are designed to be fully compatible with the ADFS filling system therefore making it compatible with all existing software on the market. When installed the software appears as an icon on the desk top in the same manner as the floppy disk drive icon and is accessed in the same way.

The card itself will support drives with a maximum of 8 heads and 1024 cylinders. This gives a present total maximum capacity on any one drive of 86MB.

The podule comes in a colour coordinated steel case which fixes to the rear of the A3000. The hard disk mechanism is enclosed in a separate steel case (also colour coordinated) with switch mode power supply and whisper quiet fan to ensure that the unit remains cool. This unit is connected to the ST506 podule via centronics type shielded cable to prevent any RF interference from the hard disk and podule.

20MB and 40MB hard disks are supplied as standard but other sizes are available on request.

★ *Super fast - 16 bit interface and 28ms disk drive make this a really speedy unit.*

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★ *Beautifully engineered - High quality components used including whisper quiet fan and switched mode power supply.*

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Tel: 0509 842670

Product: NStore
Price: £24.95
Supplier: HS Software, Freepost, Swansea SA2 7ZZ.
Tel: 0792 204519

THE National Curriculum – I've read the book, I've seen the film, I've even bought the paper napkins. Any piece of educational software you buy now will be chock full of references to this document and how the package supports it.

The next step has to be a series of programs to help you actually manage the curriculum, and the biggest headache in management for classroom teachers is going to be assessment.

Three packages brought out recently to address this problem employ different methods of tackling it. Their Archimedes versions are reviewed here on a BBC A3000.

Strands of Learning from S & S Computer Advice is aimed at the primary school and the idea behind it is creative and helpful. It contains a database of all the Attainment Targets up to level five in the Science, English and Technology documents and level six in Maths. The really clever thing about the package is the way these ATs are grouped and presented.

On starting up you are invited to enter the names of all the children in the class – up to 35 names which should do it for most of us. The disc is copyable within the school, so you could have one disc per class.

Having entered your class you are presented with a choice of strands to follow. These are: Communication, Scientific Method, Presentation, Awareness, Reading, Writing, Mathematical Method, Maths, Technology and Scientific Knowledge. Each is further subdivided before reaching actual ATs. Here's the power of the program, because the ATs are chosen using mostly cross-curricular themes.

Take, for instance, Communication. The first of nine sub-options is *Talking as a Skill.* This produces a group of four ATs taken from Maths, Technology and English. So you can see that the package is explicitly cross-curricular and will fit in well with the project-centred approach used in most primary schools.

Having chosen this sub-option, you get to the recording screen. This shows you the current AT, the number of ATs in the strand and allows you to choose the level to work at.

Three blank rectangles let you set that child's record for that AT. Quite what each rectangle represents is up to you, but you would probably use something like *The activity has been introduced* followed by *The child can do the activity with help* and finally *The child can do the activity unaided.* Each record can be printed out as a matrix.

Skipping through all the menus is straightforward and the program seems very useful, but there are severe reservations. From a technical point of view the package commits the heinous crime of reconfiguring the machine and, even if you finish via the menus, does not restore the old configuration. Thus you end up with 200k of ram disc and autoboot when you next switch on.

This is the kind of thing guaranteed to scare the living daylights out of any computer-wary primary school teacher. Further, this isn't even mentioned in the manual, nor how to correct it. You should be either directed to the Task Manager, or exiting the program legally should set the configuration back.

The printed records are not explained and it took a while to work out exactly what I was looking at. Worse, though, was the fact that, when printing in 80 columns, the information was not lined up with the column headings, though using condensed print sorted this.

More fundamentally, the grouping of ATs is a great idea, but is it the right thing to do for a record-keeping package? It's very helpful at the planning stage, and there are packages like Pipp that do just that. But if I'm recording I need to get quickly to a given AT, not try to think of how they are linked.

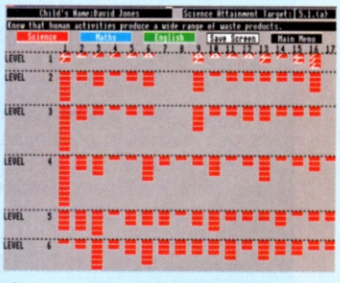
Because of this you might like to consider getting this package simply for the manual which lists all the strands and their ATs, but as a record–keeping aid I found it very limited.

HS Software's **Nstore** is trying to do the same job. The first difference you notice is that this is a proper wimp program, rather than Strands' Mode 7 screen.

The opening screen gives you the current class list up to 36 names, and clicking on a name box allows you to enter, alter or delete the contents. The disc is protected but seems to have room for 12 classes, and extra copies are available at £5 each.

The menu offers many options. The National Curriculum option shows a graphic display of the currently selected child's ATs in Maths, Science or English.

The grid is fairly familiar, with ATs along the top and levels down the side. Where the relevant numbers cross is a triangle, or parts of a triangle. One, two or three sides



Student records on NStore

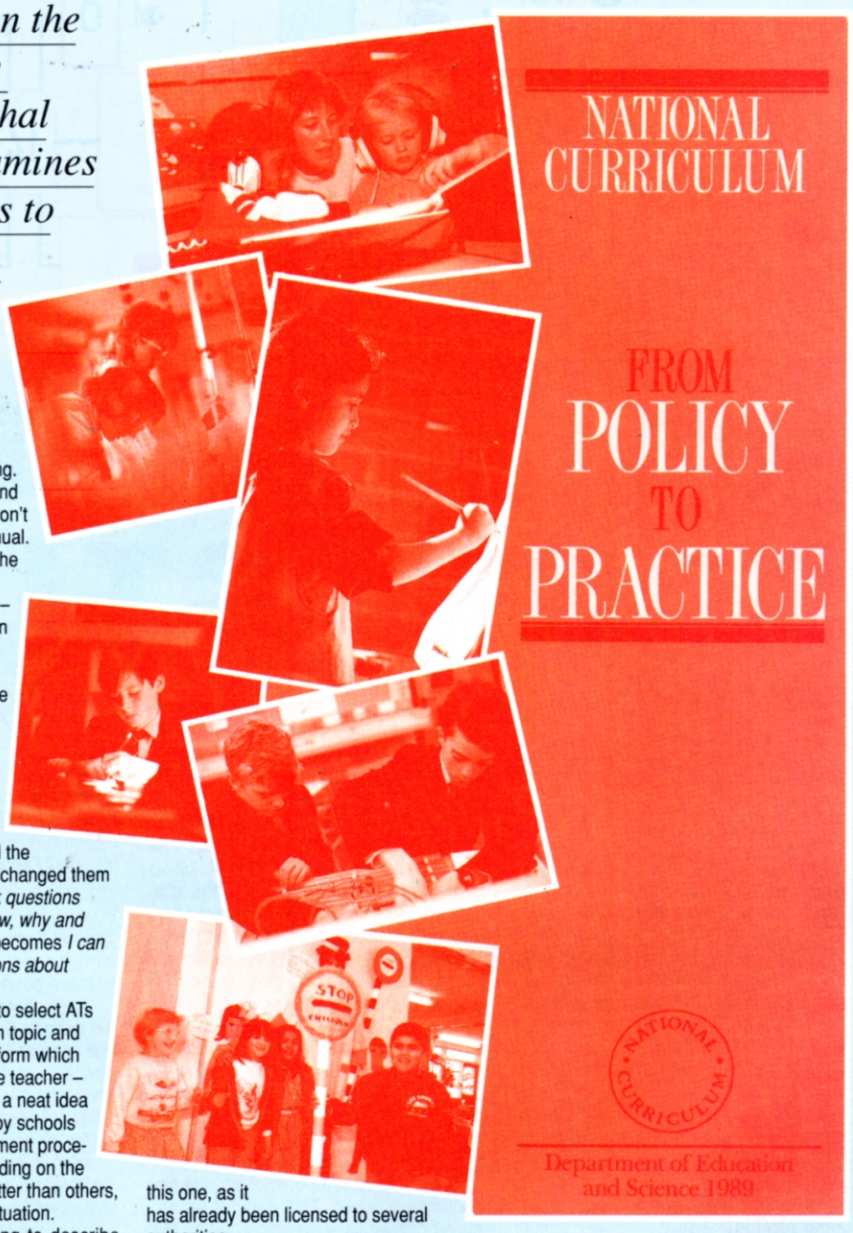
are shown. Use them as you would the rectangles in Strands, and clicking on a triangle will alter the number of sides.

This is a really well designed display – point at a triangle and the text of that AT will appear at the top of the screen. You can swap subjects with one click and even save the screen, as a sprite, to use in other packages or printout.

Under Topics you can enter the names of the subjects you are covering and then deal with them as if they were a child. You could set up a topic on Homes and mark off the ATs as they are dealt with – assuming that all children achieve them. When the topic is finished you can transfer that information to all the children in the class.

The extensive printout options allow you to select the number of levels printed and sort the information by subject, level and score. The individual child's pages and the whole class summary give information in a

With the National Curriculum on the mind of every teacher Marshal Anderson examines three products to help you plan your year



useful and easily understood form.

You should be able to do anything you want with this package in terms of recording. The whole thing is friendly and most of it is intuitive – you won't spend much time in the manual.

The only real problem is the protection. You'd probably want one disc in each class – though data can be saved on separate discs – and this might make it expensive. That aside, HS seem to have thought of everything.

School Assessment Systems have taken an entirely different approach. First of all they have gone through the National Curriculum and re-written all the ATs in simple language and changed them to the first person. Thus *Ask questions and suggest ideas of the how, why and what will happen if variety.* becomes *I can ask what, why and if questions about what will happen.*

The package invites you to select ATs that you might use in a given topic and prints them out as a simple form which the children – rather than the teacher – are meant to control. This is a neat idea and worthy of investigation by schools still working up their assessment procedures. You can alter the wording on the ATs, some of which work better than others, so you can tailor it to your situation.

Unfortunately, when trying to describe the unfriendliness of this package I am lost for a metaphor. It is a pig to use, as each target is accessed from the disc using a special code, the targets are never printed on the screen so you have to do the whole thing and go to the printer before you can see if you got it right.

SAS are working on this, but if you have a good rapport with difficult software you will probably find this package usable.

Certainly, once the bugs are ironed out the original approach will be well worth considering. At present SAS have versions for Science and Technology and Maths and English are on the way. It's worth having a word with your friendly local advisor about this one, as it has already been licensed to several authorities.

However, do you want to save children's records of assessment on disc? Computers go wrong, discs corrupt and, above all, data on a computer is not readily available.

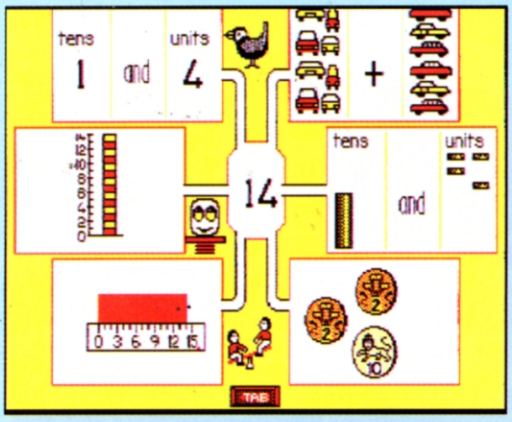
A last minute request from a parent to see you after school could put you in real trouble if the machine is at the other end of the school and maybe not attached to a printer.

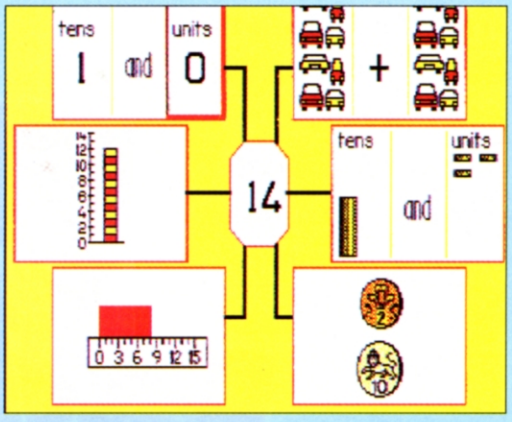
If you're going to keep hard copy in the classroom how often are you going to have to reprint the information – every time you make an alteration?

On the other hand, the HS package gives access to statistics in a compact and readable form, and so could be useful.

Summing up

I prefer paper – it's portable and goes home easily, it's ever-so multi-tasking and I can spread it all over the floor. Backing it up is a trip to the photocopier during assembly and I can pass it on to any teacher knowing they've the technical expertise to handle it. The choice is yours.





Making the right CONNECTION

Product: Connections
Price: £28.75
Supplier: Sherston Software, Swan Barton, Sherston Malmesbury, Wiltshire, SN16 OLH
Tel: 0666 840433

CONNECTIONS is yet another program from Simon Hosler. It has a mathematical flavour and is able to assist pupils with some areas of keystages one and two of the National Curriculum.

The aim of the program is very simple: Pupils must make a connection between a number at the centre of the screen and each of half a dozen different displays which surround it.

These displays contain some kind of mathematical representation. Just what they are depends on the difficulty level which the teacher has selected.

Level one features numbers up to 8 and pupils have to match the number symbol against numerals, tally charts or sets.

Level four on the other hand features numbers up to 29. This has to be made from numbers, including halves and quarters, addition or subtraction, money, measures, pictograms, bar charts or line graphs.

This program makes use of a standard Sherston feature – the Startup disc. This cannot be copied, but can be loaded into as many computers as you have, one after another. Back up copies of the work disc may then be used in each computer.

Having got the program loaded and spent time admiring the title screen, it is time to let children in the age range 5 to 9 to take over.

Three main keys are needed to operate the program, the spacebar is used for adding and Delete to remove. When a display matches the central number Return is used. This makes a pipe join the display to the numeral.

Sometimes, just for a bit of fun, the pipe becomes blocked. This sets off an animated display as some little creature performs a deft spot of unblocking. My favourite is the elephant which head butts the pipe to clear it.

If you have a Concept keyboard this may be used instead; it just needs to be connected to be available. Sherston provide first rate overlays for both sizes of this style of keyboard.

When a display is complete pressing P will print it. This feature is hidden from pupils unless the teacher tells them. Of course, the Epson routine will only print in black and white, but you may use an Integrex ink jet printer dump which needs to be transferred from the start up disc.

Another feature is a separate print disc.

Rog Frost accesses the nooks and crannies of Connections

Use this if you wish to produce paper problems for your pupils. Again, either printer type can be used.

Connections is designed very much with the National Curriculum in mind. To this end it is possible to set the program to work on specific attainment targets from either Keystage one or two. Sherston suggest personalising work discs so that they are set up for individual pupils.

Apart from the three discs and keyboard overlays there is the usual set of back up materials. These include a cartoon card to explain why the pipes block and need clearing and a couple of reference cards to give a quick guide to the program and a reminder of the keys to use.

Summing up

Most important is the teachers' book, and this is well up to the standard we have come to expect from Sherston. It deals fully with all technical matters and it also gives full advice on how to make best use of the program. Connections is another winner. Every primary school should have one.

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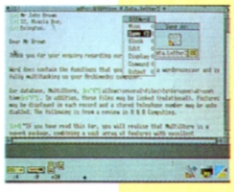
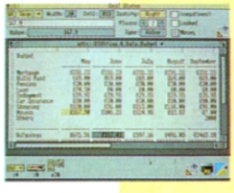
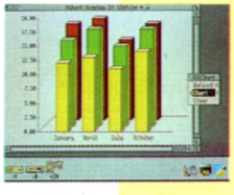
At last - a fully integrated suite of database, word - processor, spreadsheet, charts and communications for the Archimedes. The database is simple to set up with a flexible card layout enabling you to design cards to suit your data. Video style controls make it easy to browse through the records. With instant search on fields, sort routines and reports available, DTOBase gives flexibility whilst remaining simple to use.



The word - processor, DTOWord is ideal for all types of correspondence, with the ability to change text to bold or condensed, indent, centre, justify etc. DTOWord makes every document look professional. Text can be any colour and even displayed in large characters on screen making this package ideal for young children or those with poor sight.



DTOSheet is fast and powerful but designed for ease of use. Columns can be held for reference and cells locked to prevent accidental deletion. With colours available to highlight negatives or formulae DTOSheet gives all the features you would expect of a high class spreadsheet. Data can be exported directly into DTOChart allowing pie charts, 3D bar charts, etc to be produced in seconds. Sections of pie charts can be highlighted and the colours changed to your requirements.



The final package in the suite is the communications program DTOComms. Multi - tasking, even on line, DTOComms supports ANSI and TV1925 emulations and is configurable for all baud rates and protocols. Text files can easily be transmitted and received.

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Three ways to cut you pi

by Jon Millington

THE symbol π – pronounced *pi* – represents a number that has proved very useful in mathematics. It first appeared as the number of times the diameter of a circle can be divided into the length of the circumference.

However it crops up time and again in many different places, some quite unexpectedly. The only serious problem with π is that it isn't a whole number. In fact it isn't an exact fraction either – it's one of a small group of numbers that can't be written down at all, except by using a symbol or a rough approximation.

A popular pastime of early mathematicians was working out ways of calculating π – so here's a short program that illustrates three techniques.

One of the first formulae for π was obtained by the French mathematician Francois Vieta in 1592. He used circumscribed and inscribed polygons – circles drawn on the outside and inside – to approximate the circumference of the circle and found that:

$$\frac{2}{\pi} = \frac{\sqrt{2}}{2} \times \frac{\sqrt{(2+\sqrt{2})}}{2} \times \frac{\sqrt{(2+\sqrt{(2+\sqrt{2})}}}{2} \times \ldots$$

from which:

$$\pi = 2 \left(\frac{2}{\sqrt{2}} \times \frac{2}{\sqrt{(2+\sqrt{2})}} \times \frac{2}{\sqrt{(2+\sqrt{(2+\sqrt{2})}}} \times \ldots \right)$$

As the program shows, this infinite product soon produces 3.14159265, the first nine significant figures of π.

John Wallis of Oxford discovered another infinite product in 1656:

$$\frac{2}{\pi} = \frac{1}{2} \times \frac{3}{2} \times \frac{3}{4} \times \frac{5}{4} \times \frac{5}{6} \times \frac{7}{6} \times \ldots$$

from which:

$$\pi = 2 \left(\frac{2}{1} \times \frac{2}{3} \times \frac{4}{3} \times \frac{4}{5} \times \frac{6}{5} \times \frac{6}{7} \times \ldots \right)$$

A snag about this formula is that many terms are needed before recognisable values for pi appear. The program displays successive values together with the current denominator alternately in the top and bottom parts of the screen.

In 1674, the German philosopher Gottfried Leibniz showed that:

$$\frac{\pi}{4} = 1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \frac{1}{9} - \frac{1}{11} + \ldots$$

from which:

$$\pi = 4 - \frac{4}{3} + \frac{4}{5} - \frac{4}{7} + \frac{4}{9} - \frac{4}{11} + \ldots$$

The results are displayed in the same way as for Wallis, and again, convergence is slow.

So type in the listing, ensure you've made no errors using the checksum and take a look how the formulae above have been programmed to calculate this elusive number.

Variables

- **V** The starting value of the number which will eventually be π.
- **N%** The denominator of the current fraction which is either, for Wallis, multiplied by the previous one or, for Leibniz, alternately subtracted and added from it.
- **N** Initially the square root of two, is then the square root of its previous value plus two.

```
 10 REM Pi - Three Formulae
 20 REM by Jon Millington
 30 REM (c) The Micro User
 40 MODE 7:VDU 23,1,0;0;0;0;
 50 PRINT"1-Vieta 2-Wallis 3-Leibniz"
 60 ON GET-48 GOTO 210,140,70 ELSE 60
 70 PRINT''"Leibniz":V=4:N%=1
 80 REPEAT
 90 PRINT TAB(9,14);V TAB(16);N%
100 N%=N%+2:V=V-4/N%
110 PRINT TAB(9,10);V TAB(16);N%
120 N%=N%+2:V=V+4/N%
130 UNTIL V=PI:END
140 PRINT''"Wallis":V=2:N%=0
150 REPEAT
160 N%=N%+2:V=V*N%/(N%-1)
170 PRINT TAB(9,14);V TAB(16);N%-1
180 V=V*N%/(N%+1)
190 PRINT TAB(9,10);V TAB(16);N%+1
200 UNTIL V=PI:END
210 PRINT''"Vieta":V=2:N=SQR 2
220 REPEAT PRINT;V
230 V=2*V/N:N=SQR(2+N)
240 UNTIL V=PI:END
```

```
 10 =     0 0
 20 =     0 0
 30 =     0 0
 40 =   5AC C
 50 = 898B 0
 60 = 29AE 8
 70 = 28D4 9
 80 = BFBA 2
 90 = 864F B
100 = 5FC6 3
110 = 8B9B C
120 = 9243 1
130 = BB9F 8
140 = 7C92 B
150 = BFBA 9
160 = 7AB8 A
170 = 5EDD C
180 = A118 4
190 =  9DE 2
200 = BB9F 1
210 = A3C5 6
220 = 1C71 0
230 = B4BD 1
240 = BB9F 1
```

Breakdown

Line	Action
40	Selects Mode 7 and switches off the cursor.
50	Displays the three program choices.
60	Waits for you to press the appropriate key.
70	Tells you that you chose the Leibniz formula and also sets *V* to four and *N%* to one.
80 to 130	The loop for the Leibniz formula.
90 and 110	Print the current approximation to π.
100	Adds two to *N%* and subtracts *4/N%* from *V*.
120	Adds two to *N%* and *4/N%* to *V*.
140	Tells you that you chose the Wallis formula and sets *V* to two and *N%* to zero.
150 to 200	The loop for the Wallis formula.
160	Adds two to *N%* and changes *V* accordingly.
170 and 190	Prints the current approximation to π.
180	Changes *V* as determined by the formula.
210	Tells you that you chose Vieta's formula, and sets *V* to two and *N* to the square root of two.
220 to 240	The loop for Vieta's formula.
220	Prints the current approximation to π.
230	Changes *V* and *N* as determined by the formula.

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Approaching a supply depot

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Your mission

YOUR target is to liberate a river valley that has been occupied by your adversaries. All you have at the start is one airfield and your plane, armed with four Sidewinder air-to-air missiles, about 30 rockets (fired in pairs) and several thousand rounds of ammunition.

The overall plan is to fly up the valley capturing airfields until you reach the grand headquarters. However things are never quite that simple.

The enemy

EACH enemy airfield is protected by anti-aircraft guns (ack-ack) and resupplied by trucks from various depots along the way. The river is the main landmark all the way up the valley. The road, along which the trucks travel, crosses it regularly.

So by knocking out the bridges and destroying supply depots as you find them will prevent airfields from being restocked. Unfortunately the enemy also have barges on the river which rebuild the bridges, so you need to zap these too.

In addition to the ground-based ack-ack, each airfield is stocked with at least two planes and there is the occasional surface-to-air missile (SAM) base.

With all this against you, is it possible to win? Well, yes, but it takes a while.

Strategy

LET'S analyse the problem: To gain ground you need to take airfields and to do this you need to prevent them from being re-supplied.

So the main task is to knock out the next bridge past the field you want to take as quickly as possible, while avoiding being shot down by the planes, ack-ack and SAMs.

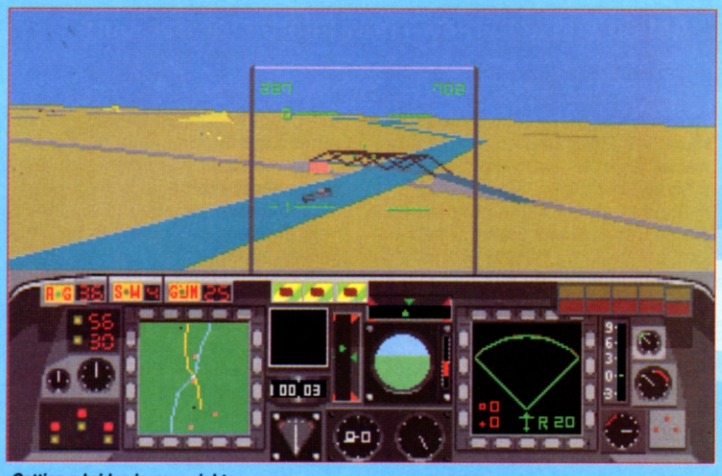
Here's a typical initial foray into enemy territory:

- Take off from the starting field and set a heading of 010 at 5,000 feet.
- Reduce speed to 300 knots and switch to ground attack screen (keypad 5).
- Locate the first bridge and when it's positioned in the lower third of the screen begin your dive. You can use the braking flaps (key D) to slow your descent but remember to retract them when you pull out.
- You'll need to hit the bridge with

DICTOR

about five salvoes of missiles before it's demolished.

- Pull up before you get below 150 feet, or you won't make it.
- Take a heading of 340 but zig-zag to avoid the ack-ack. You can try to take out the gun as you pass it but that's not vital.
- Climb back to 5,000 feet and switch to radar display. A plane will take off from the airfield. It appears as a square on the display – the airfield is the cross.
- You will need to dispose of the plane that's attacking. One technique is to fly head on at your opponent but aimed slightly below him and select the machine gun. At the last moment start firing and pull up. Your bullets should cut across the path of the oncoming plane and down it.
- Set full thrust, maintain 5,000 feet and set a heading of 000, make any minor course adjustments so that you're heading for the next bridge. By the time you reach it there'll be another plane behind you but the bridge is more important. There is ack-ack here so take evasive action.
- Attack the bridge as before but try not to overshoot the river too much otherwise you will cause planes from the next field to be scrambled.
- If a barge is visible you'll have to sink it before it undoes all your good work.
- Remove the plane that's following you and fly back towards the airfield – your heading should be about 200. Watch out for any trucks and use machine guns to destroy them.
- There is one ack-ack gun at the west end of the first airfield and this must be knocked out. Use the same technique as for bridges, but you'll have to be more careful as guns shoot back!



Getting a bridge in your sights

There's not much time to fire enough salvoes

The exact technique and order of destruction for each airfield will vary but, in general, use the following order:

- SAM sites: These must go first as it's very hard to dodge a radar-locked missile even with chaff to help. Fly in under 300 feet and destroy with rockets or machine guns.
- Bridges: Must be removed to prevent re-supply. Attack as described above. Only rockets have any effect.
- Planes: Since they shoot at you they must be removed, but don't break off attacking more important targets until they actually engage – just keep an eye on them. Use sidewinder missiles if they are not using flares, otherwise use your machine guns. Don't don't waste rockets unless you know what you're doing.
- Ack-ack: Those located near airfields must be destroyed but others should only be removed as necessary. Closer to the enemy HQ they become very numerous and have to be eliminated, using machine guns or rockets.
- Barges: Keep an eye out for them and destroy them when convenient. Four rockets or your machine gun should do the trick.
- Trucks: If you keep the bridges down and blow up the depots you shouldn't need to shoot the trucks – which is just as well as this is very difficult. Again, both rockets and guns are effective.

Landing

THIS is probably the most difficult part of any flight simulator and Interdictor is no exception. It's wise to practise landings on your home airfield before attempting the mission. The idea is to approach as slowly as possible, lined up along the runway with the plane in a flat attitude – and the landing gear down.

Until you're experienced start all approaches a long way away from the airfield itself. Start by overflying the runway along its length, and climb to about 3,000 feet while flying away from it.

Now turn tightly and fly back along your route. Reduce thrust to about one third and aim directly at the nearest end of the runway. Lower the landing gear and put the brakes on ready. When you're down to 1,000 feet deploy the braking flaps to slow your descent even more.

When you get to an altitude of 250

➤
feet pull back to level the plane – keep the nose up as you drop. Reduce thrust to minimum when you cross the runway and as you touch down cut the engines completely and push forward to hold the nose down.

You don't need to land exactly on the runway, any part of the area between the runway, taxi-ways and hangers is safe. Remember: *Never rush a landing. If it's going wrong pull up, increase thrust and go round again, not forgetting to retract your braking flaps.*

Action and accuracy – how Interdictor was born

INTERDICTOR is an astounding flight simulator – very accurate and very playable. Though distributed by Clares who are well-known and highly respected in the Acorn market the actual game was written by a company called Simis.

So, who are Simis? And how did they come to write such a superb simulation, apparently without any previous experience on the Archimedes? We set out to discover the truth and tracked down Jonathan Newth, one of the four programmers that make up Simis.

Based in Guildford the complete team – Chris Tubbs, Ian Bavistock, David Payne

Title screen from the first Interdictor

and Jonathan Newth – were all part of a research department at British Aerospace in Surrey working on numerous military projects involving graphic simulations.

Then, two years ago, David Payne bought an Archimedes and realised that, for the first time, here was a home computer that could handle the calculations needed to drive a fully-fledged flight simulator.

To this end he wrote the direct ancestor to Interdictor, a very simple blue sky/brown earth display program which could be flown from the keyboard.

Around that time he also visited a computer show and on Acorn's stand spoke to various exhibitors, including Dave Clare who's enthusiasm encouraged him to write a complete game.

So over the next six months, from April to September, David Payne worked long weekends, and even longer nights, putting the program together. He was ably assisted by Ian who worked on the head-down display.

The idea for the scenario – taking over a river valley occupied by enemy forces – was entirely Dave's, but was designed to allow the interaction between the different parts of the game: The ground forces of ack-ack and surface-to-air missiles protect the airfields and are in their turn protected by the planes.

All the ground bases are re-supplied by trucks which come from supply depots and have to travel along the roads which regularly cross bridges over the river, There are river barges which repair the bridges – after you've blown them up.

This makes for much more than just a simple shoot everything in sight game – there is strategy involved and you have to make decisions about which targets must be taken out first.

Around 95 per cent of the game was programmed in C while the most time-critical parts – the actual screen plotting routines – were coded directly into ARM code. This compromise ensured a program that runs fast and was relatively easy to write – or more importantly, one that two people could write together and still have the two parts mesh properly.

As the program approached completion it underwent exhaustive testing by Jonathan: "I've actually completed the game three times. The first time took 35 aircraft and six game hours but my best ever was using just two planes in 90 game minutes. However that's not the best I've heard about."

Finally the game went on sale through Clares and was hailed as the greatest flight simulator ever produced on a home micro.

In the meantime, however, things were afoot: The four friends decided to set up business on their own and hence began Simis, but the company does a lot more than just write games.

"What we do mainly is contract graphics and simulation work for Industry, the military and medical companies", said Jonathon. "In addition we distribute artificial intelligence software." Of course, none of that fits into an Acorn machine.

Dave Clare was so pleased with the success of Interdictor he went back to Simis to ask for a follow-up. The original intention was for just a different scenario but it didn't quite work out like that. With the other two members of the team – Chris and Jonathan – doing most of the programming Interdictor II involved a complete re-write.

"The main complaint about the first version of Interdictor was the lack of grand detail – no incidentals like trees, just the occasional mountain." said Jonathon.

But to get more detail the programming had to be improved – Interdictor I had been working nearly flat out, but now there were plans to increase the number of objects that needed plotting by many times.

"In fact Interdictor II runs very much faster but the complexity of the scene means that the time taken to draw the screen is the same as before."

The second game took about the same development time but the software tools used to develop it had come a long way. A special multi-tasking Ground Editor was written so that the complete terrain could be designed easily and a 3D shape editor was created to produce the various objects.

The new game is also written in C, but this time the concept of object-oriented programming was included.

Said Jonathan: "It would have been impossible to program something this complicated with all the interaction between the different parts by normal programming methods."

Each enemy plane has a number of techniques it uses to fight back. In addition, there is a built-in multi-level expert system controlling them, making their tactics more intelligent and less predictable.

David Payne wrote the actual simulation model for the plane again but this time included much more accuracy – the plane's

Interdictor II opening screen

behaviour on the ground is vastly improved and every single surface of the plane has the forces acting on it calculated individually. These are then added together and the plane moves through the air – or not, as the case may be.

The level of sophistication in Interdictor II is such that it is even better than in some of the flight simulators used to train professional pilots.

● *As you'd expect, it took the very best programmers in the field of graphics and simulation working with the most powerful home micro to produce the ultimate flight simulator – and that's Interdictor.*

If you haven't an Archimedes, how would you like to take one home and test fly Interdictor for yourself?

That is the offer being made by dozens of participating Acorn dealers throughout Britain, as part of a unique promotion for their Archimedes Learning Curve package.

It means you can go home with an A420/1, together with a wide collection of software – including Interdictor.

You can keep it for a 14 day Home Test Flight, which will give you plenty of opportunity to find out for yourself all the qualities of this remarkable machine.

● Many dealers will also let you fly Interdictor on their premises – using an Archimedes or a BBC A3000 – and you can also take part in a competition and win a real-life flight in Concorde.

All you have to do is answer three simple questions on the Test Flight brochure.

For runners up there will be more prizes, including helicopter or light aircraft flightr training weekends or Citizen Aerochron watches.

Where to go for your

TEST FLIGHT

Visit any of the Acorn dealers listed below and take an Acorn Test Flight. Experience the amazing speed and computing power of 32 bit Risc technology. Discover the superb graphics, sound, creativity and animation available at your fingertips. Then unleash the power by taking the controls of the sensational flight simulator, Interdictor. At the dealers marked ● you can ask for details of a 14 days Home Test Flight and enter the FREE competition – with prizes that are really out of this world. You could find yourself taking to the skies in Concorde, or going for a flip in a light aircraft or helicopter

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- CCE Catsoft Ltd, 80 North Road, Yate, Bristol, Avon, BS17 5PR, 0454 321088

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- Beilby Computing, 59 Linslade Road, Heath & Reach, Leighton Buzzard, Bedfordshire, 052523 614

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Soft Shop Ltd, 55 St Peter's Court, Chalfont St Peter, Buckinghamshire, SL9 9QQ, 0753 889010

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- Micro Studio Ltd, 22 Chruchgate Street, Soham, Ely, Cambridgeshire, CB7 5DS, 0353 720433

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- Customised Electronics Limited, 4 Bulmer Way, Cannon Park, Middlesborough, Cleveland, TS1 5JT, 0642 787676

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- Cumbria Software Systems Ltd, 3a Townfoot Industrial Estate, Brampton, Cumbria, CA8 1SW, 0697 73779

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- Minerva Systems, 69a Sidwell Street, Exeter, Devon, EX45 6PH, 0392 437756
- Wants, 91 New George Street, Plymouth, Devon, PL1 1RQ, 0752 673211
- West Devon Electronics, Station Road, Horrabridge, Yelverton, Devon, 0822 853434/854895

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- Computer Workshop, 7a Peter's Street, St Helier, Jersey, Channel Islands, 0534 77799

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- Atomic Computer Services, Computer Centre, 39 Standish Street, Burnley, Lancashire, BB11 1AP, 0282 34772
- Lancashire Microcomputers, 42a Station Road, Ainsdale, Southport, Lancashire, 0704 73600

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- DA Computers Ltd, 105 London Road, Leicester, Leicestershire, LE2 0PF, 0533 549407

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- Automatic Services, 217 Wood Street, Walthamstow, London, E17 3NT, 081 521 1784
- JP Computer Systems, 130 Arthur Road, Wimbledon Park, London, SW19 8AA, 081 946 8913
- Leopard Technology, 7 Oakhill Avenue, London, NW3 7RD, 071 435 0005

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- Microcare (NI) Ltd, Bridgewood House, New Forge Lane, Malone Road, Belfast, Northern Ireland, BT9 5NW, 0232 381212

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Academy Computer Shop, 94 Academy Street, Inverness, Highland Region, IV1 1LU, 0463 711430

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- Cardigan Electronics, Chancery Lane, Cardigan, Dyfed, AS43 1HD, 0239 614483

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- Gwent Computers Ltd, 92 Chepstow Road, Newport, Gwent, NP9 8EE, 0633 841760

Frizzled, frazzled and frozen

The Mad hatter travels to the bottom of the world in search of a drink

Elite short cuts

I have had a very interesting letter from Ailan Bashavan who offers advice on making both missions easier and they are worth passing on in case some of you are utterly frustrated.

Mission One: On arrival at Cearso you are invited to cross almost the whole galaxy to Errius before being sent all the way back again to Orarra. Ailan says that if you proceed straight to Orarra – which is close to Cearso – and then Jump into deep space you'll soon encounter the Constrictor.

Mission Two: First of all make sure you are very wealthy. He suggests using the mining laser routine as a get rich quick method. Long time readers of this column will remember that if you attempt to buy this Laser when you already have it, a bug in the program ensures that you gain 3570 credits every time.

Next, when you are in Galaxy 3 make sure you have an escape capsule and try to confine your hyperspace jaunts to planets of tech level 6 or higher.

Then it's just a matter of hitting Escape every time you emerge from hyperspace, buying a new capsule and moving on.

You can see why wealth is essential, and even using this method you'll still have to take your chance against Thargoids from time to time.

Ailan also notes that you can destroy any trader you come across while in the safe zones without inviting retribution from the police.

However he warns against attacking the Viper which accompanies you on your travels from time to time.

While on the matter of short cuts, a number of readers have sent in details of cheats for **Elite** including a number of listings. It's become fairly clear that these are based on a program available on disc from Superior called *Cheat it Again Joe.*

This means that if I were to publish any we'd be in the soup because of copyright. However, readers in distress who just can't make progress – even with the help I offer of a Competent Commander and assorted goodies if you send me a formatted disc and 50p to cover return postage and packaging – at least now know where to buy it.

If Mark Sharpe (15) from St. Albans would like to try again, I'll see what I can do about giving him some goodies: Unfortunately I received neither disc nor return postage. I think his mistake was to try and write a single letter to Hac Man *and* Hatter combining a couple of requests. That's the way things get lost in the internal mail.

A young stripling by the name of Commander Andy has an interesting comment for those who like to make mincemeat of Vipers. Leave the space station in the normal way, accelerate and switch to your rear view.

As soon as you can just see the station rotating, flip over and loose off a couple of laser shots. As the Vipers emerge you should now be able to knock them off without moving at all.

Andy also reminds us that any enemy commander who ejects can be scooped up and sold as slaves if you have room in your hold.

Personally, if they attacked me first, I take great delight in zapping the fleeing escape capsule with my laser. If the novella is to be believed, the inhabitant then spends a long time in a smelly space suit waiting around to be rescued. Serves the stinker right.

I had a plea from Commander RAZ (K. Astill) asking for basic information – he's only been following the column for a year or so, and wonders about the missions.

Well RAZ, they are only triggered once you have achieved a certain status – Dangerous – and so you have to spend time in Galaxy One blasting baddies until the mission is automatically triggered. Then you have to track down and destroy a stolen experimental ship, the Constrictor.

Mission Two involves taking a message about secret Thargoid plans from one side of Galaxy 3 to the other. Unfortunately, somehow or other the news of your journey is leaked and life becomes somewhat hairy. So the word for all newcomers to Elite is blast away, and remember: All things come to him who waits.

I have had a number of requests for Commander Foztek's program showing your current status, and it is sufficiently different from the last one I featured to make it worth while: So, here it is:

WE are pretty well into the heart of *Oxbridge* now, and next we'll visit Antarctica and Mexico in our treasure hunting exploits. Believe me, great care is going to be necessary.

There are certain principles lying behind the puzzle construction in this section that are well worth dealing with by way of a tutorial before I give the actual moves involved.

It will help you to see how a clever adventure designer – in this case Colin Jack – thinks, and why I rate this type of game so highly.

There are six puzzles to be solved: Safe travel to the Antarctic and Mexico, collecting the meteorite, the map and golden horn, and retrieving the tequila.

Safe travel involves making sure that you are carrying a passport and that you avoid the red direction indicated on the matter transmitter.

This is pretty straightforward stuff involving normal thought processes – serious travel usually involves some kind of documentation and red is a colour that should usually turn your thoughts to danger.

Anyone who doesn't save their position before doing something involving red markings is really asking for trouble.

Colin's notes on Antarctica and the Mexican desert are worth passing on more or less verbatim. In both places the locations are uniquely identifiable in the same way as are many mazes.

In Antarctica weather conditions indicate which ring you are on (latitude) and weather box colour gives your bearing (longitude). South, naturally, takes you inwards towards the building at the Pole and North does the reverse. East (clockwise) and West (anticlockwise) provide the movements you'd expect to see if you were looking down upon the South Pole.

The challenge in this puzzle is to visit each location once, and once only. As Colin writes: *The problem is, in fact, directly equivalent to the classical problem of visiting each vertex of a dodecahedron by moving along connecting edges, but it is not necessary to realise this to complete the puzzle.*

My personal comment here is that Colin illustrates precisely how a good adventure designer works: There's fun for those with a mathematical mind, but people like me can still tackle it without frustration – we just miss some of the elegance involved.

The desert problem is similarly flavoured – you are allowed one attempt only at digging before retribution rushes in. This is why using up part of your precious strength allowance on carrying the mop around with you finally pays off – not only has it been valuable to identify point-scoring items thus far, but it will now prove vital in locating the buried treasure. Movement in the desert is aided by the fact that, once again, each location is identified by a unique combination of cacti. Clockwise movement takes you into the oasis and anti-clockwise moves take you out.

It's all pretty logical, as things should be in properly written adventures. So off we go.

Arm yourself with the shovel – buried treasure for the excavating of – and leave the Trophy Room by going E, N, N, N, N and N. SAY EXEAT to leave college and continue N, N, W, W, W, W, N, N, N, E, N, N, E, E, E, E, E, E, E, N, W, W, W and take the meteorite.

Now go W, S, W, S, W, W, W, S, S and take (and read) the map. From here proceed S, S, S, S, S, E, W and W. Note that the next section of moves are deliberately highlighted by Colin in his audit trail, so pay particular attention.

Vital moves are: N, N, TAKE TEQUILA, THROW TEQUILA, N, E, N, W, SW, S, SE, E, and NE. The mop should mutter here so DIG WITH SHOVEL, TAKE HORN, N, NW, W, DROP SHOVEL, TAKE MAT, E, SE, S, SW, W, NW, N, NE, E, N, S, S, S, N, DROP PASSPORT, TAKE TEQUILA and relax.

From this point the moves should be familiar: S, S, S, S, S, S, S, S, S, S, S, S, W and then you can drop the meteorite, mat, map, tequila and horn.

Now save your position and confirm that your score is 70.

(Continued next month)

```
  10 REM ELITE COMMANDER PRINTER
  20 REM by Foztek
  30 REM For The  Micro User
  40 DIMbyte%(&4F),message$(&4F)
  50 DIMtype%(&4F),value%(&4F)
  60 DIMtemp%(3)
  70 MODE7
  80 PRINT"Input Commander's Name"
  90 *DIR E
 100 *.
 110 *DIR $
 120 INPUT"Commander ",inname$
 130 infile%=OPENIN("E."+inname$)
 140 IFinfile%<>0THEN180
 150 PRINTinname$;" not found"
 160 inname$=CHR$(0)
 170 GOTO70
 180 IFEXT#infile%=&100THEN230
 190 PRINTinname$;
 200 PRINT" is not an Elite File"
 210 inname$=CHR$(0)
 220 GOTO70
 230 FORcount%=0TO&4F
 240 byte%(count%)=BGET#infile%
 250 NEXTcount%
 260 CLOSE#infile%
 270 PRINT"<S>creen or <P>rinter"
 280 G$=GET$
 290 IFG$<>"S"VDU2,1,27,1,64,3
 300 CLS
 310 IFG$="S"PRINT"SHIFT TO SCROLL!":VD
U14
 320 IFG$<>"S"VDU2,1,27,1,69,1,27,1,71
 330 IFG$<>"S"VDU1,14,1,27,1,120,1,1,1,
27,1,126,1,49,1,1
 340 PRINT"COMMANDER ";inname$
 350 IFG$<>"S"VDU2,1,27,1,64,3
 360 IFG$<>"S"VDU2,1,27,1,69
 370 PRINT'"Fuel"SPC9": ";byte%(13)/10
;" light years"
 380 PRINT"Cash"SPC9": ";
 390 cash=0
 400 FORcount%=9TO12
 410 cash=256*cash+byte%(count%)
 420 NEXTcount%
 430 PRINT;cash/10;" Cr"
 440 PROCposition
 450 PRINT"Legal Status : ";
 460 IFbyte%(52)=0THENPRINT"Clean"
 470 IFbyte%(52)>0ANDbyte%(52)<32THENPR
INT"Offender"
 480 IFbyte%(52)>31PRINT"Fugitive"
 490 PRINT"Status       : ";
 500 kills=0
 510 FORcount%=72TO71STEP-1
 520 kills=256*kills+byte%(count%)
 530 NEXT
 540 IFkills<8THENPRINT"Harmless ";:nee
d=&8
 550 IFkills>7ANDkills<10THENPRINT"Most
ly Harmless ";:need=&10
 560 IFkills>&FANDkills<&20THENPRINT"Po
or ";:need=&20
 570 IFkills>&1FANDkills<&40THENPRINT"A
verage ";:need=&40
 580 IFkills>&3FANDkills<&80THENPRINT"A
bove Average ";:need=&80
 590 IFkills>&7FANDkills<&200THENPRINT"
Competant ";:need=&200
 600 IFkills>&1FFANDkills<&A00PRINT"Dan
gerous ";:need=&A00
 610 IFkills>&9FFANDkills<&1900PRINT"De
adly ";:need=&1900
 620 IFkills>&18FFPRINT"ÑÑ E L I T E
ÑÑ";:need=0
 630 PRINT"(";kills;" kills)"
 640 PROCmission
 650 IFG$<>"S"VDU1,27,1,71
 660 PRINT'"EQUIPMENT:"
 670 IFG$<>"S"VDU1,27,1,72
 680 IFbyte%(40)>0PRINT"E.C.M.System"
 690 IFbyte%(41)>0PRINT"Fuel Scoops"
 700 IFbyte%(42)>0PRINT"Energy Bomb"
 710 IFbyte%(43)<>2PRINT"Energy Unit  (
Strength ";byte%(43);")"ELSEIFbyte%(43)=
2PRINT"Naval Energy Unit  (Strength 2)"
 720 IFbyte%(44)>0PRINT"Docking Compute
rs"
 730 IFbyte%(45)>0PRINT"Galactic Hypers
pace"
 740 IFbyte%(46)>0PRINT"Escape Pod"
 750 PRINT;byte%(51);" Missiles"
 760 PRINT;byte%(22)-2;" ton Cargo Bay"
 770 IFbyte%(16)>0PRINT"Front ";:PROCla
ser(16)
 780 IFbyte%(17)>0PRINT"Rear  ";:PROCla
ser(17)
 790 IFbyte%(18)>0PRINT"Left  ";:PROCla
ser(18)
 800 IFbyte%(19)>0PRINT"Right ";:PROCla
ser(19)
 810 PRINT
 820 IFG$<>"S"VDU1,27,1,71
 830 PRINT"PRESENT CARGO:"
 840 IFG$<>"S"VDU1,27,1,72
 850 PROCcargo
 860 IFG$<>"S"FORX=1TO10:PRINT:NEXTX
 870 IFG$="S"VDU15:G=GET
 880 VDU3
 890 RUN
 900 ENDPROC
 910 DEFPROClaser(pos)
 920 IFbyte%(pos)=&0FPRINT"Pulse   ";
 930 IFbyte%(pos)=&32PRINT"Mining  ";
 940 IFbyte%(pos)=&8FPRINT"Beam    ";
 950 IFbyte%(pos)=&97PRINT"Military";
 960 PRINT" Laser  (Strength ";byte%(po
s);")"
 970 ENDPROC
 980 DEFPROCmission
 990 PRINT"Notes"SPC8": ";
1000 IFbyte%(0)<1PRINT"No missions star
ted"
1010 IFbyte%(0)=1PRINT"On first mission
"
1020 IFbyte%(0)>1ANDbyte%(0)<10PRINT"Co
mpleted first mission"
1030 IFbyte%(0)>5ANDbyte%(0)<&EPRINT"On
```

```
second mission"
 1040 IFbyte%(0)>&DPRINT"Completed Both
Missions"
 1050 PRINTSPC15;byte%(72);" ""Right On
Commander!""";:IFbyte%(72)<>1PRINT"s"
 1060 PRINTSPC15"Needing ";
 1070 IFheed=0PRINT"no kills!"ELSEPRINT;
need-kills;" kills"
 1080 ENDPROC
 1090 DEFPROCposition
 1100 PRINT"Location     : ";byte%(1);",
";;byte%(2);" in Galaxy <";byte%(15)+1;"
>"
 1110 ENDPROC
 1120 DEFPROCcargo
 1130 IFG$<>"S"VDU1,27,1,&70,1,0
 1140 IFbyte%(23)>0PRINT"Food          "
byte%(23);"t"
 1150 IFbyte%(24)>0PRINT"Textiles      "
byte%(24);"t"
 1160 IFbyte%(25)>0PRINT"Radioactives  "
byte%(25);"t"
```

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If you prefer to save the wear and tear on your fingers you'll find this listing – together with all the others from this issue – on this month's disc, sent free if you subscribe to *The Micro User*.

```
 1170 IFbyte%(26)>0PRINT"Slaves        "
byte%(26);"t"
 1180 IFbyte%(27)>0PRINT"Liquor & Wines"
byte%(27);"t"
 1190 IFbyte%(28)>0PRINT"Luxuries      "
byte%(28);"t"
 1200 IFbyte%(29)>0PRINT"Narcotics     "
byte%(29);"t"
 1210 IFbyte%(30)>0PRINT"Computers     "
byte%(30);"t"
 1220 IFbyte%(31)>0PRINT"Machinery     "
byte%(31);"t"
 1230 IFbyte%(32)>0PRINT"Alloys        "
byte%(32);"t"
 1240 IFbyte%(33)>0PRINT"Firearms      "
byte%(33);"t"
 1250 IFbyte%(34)>0PRINT"Furs          "
byte%(34);"t"
 1260 IFbyte%(35)>0PRINT"Minerals      "
byte%(35);"kg"
 1270 IFbyte%(36)>0PRINT"Gold          "
byte%(36);"kg"
 1280 IFbyte%(37)>0PRINT"Platinum      "
byte%(37);"kg"
 1290 IFbyte%(38)>0PRINT"Gem-Stones    "
byte%(38);"g"
 1300 IFbyte%(39)>0PRINT"Alien Items   "
byte%(39);"t"
 1310 FORcount=23T039
 1320 total=total+byte%(count)
 1330 NEXTcount
 1340 IFtotal<1PRINT"None carried"ELSEPR
INT"Total Cargo   "total
 1350 ENDPROC
```

Get it right ✓

```
10 =    0 0   150 = 1A2C 1   290 = 8927 8   430 = 2AAE 6   570 = 4D78 C   710 = F6F5 C   850 = 7B08 8   990 = CC81 D
20 =    0 0   160 = 2FBF A   300 = 7A16 7   440 = 7A2F 1   580 = 72F0 F   720 = FA52 5   860 = D019 E  1000 = 5BFD 9
30 =    0 0   170 = D226 3   310 = 83DB 0   450 = 7F0C F   590 = FF65 D   730 = C81B 3   870 = 192F C  1010 = 69DD 9  1130 = 57EA 0  1250 = 1AB6 C
40 = 2761 1   180 =  614 7   320 = 1AB4 8   460 =  799 5   600 = C2BC 4   740 = 7C8B F   880 =  6BC B  1020 = 5FB2 3  1140 = 943F E  1260 = 26B5 A
50 = E9B9 A   190 = 9B8A 2   330 = A254 D   470 = 677C 1   610 = 2382 0   750 = CF27 2   890 = 7E36 2  1030 = E1D7 B  1150 = 2710 A  1270 = 56CF 4
60 = F802 D   200 = AF35 1   340 = DBB6 7   480 = 554D A   620 = 8A73 6   760 = 8246 3   900 = ED0F 8  1040 = 5F4E D  1160 = 5205 D  1280 = 181C 8
70 = 8AFC 2   210 = 2FBF 8   350 = 8927 8   490 = EBA1 9   630 = 425B 5   770 = 6CD0 9   910 = 13B3 4  1050 = A918 A  1170 = 2554 6  1290 = B365 4
80 =  33A 0   220 = D226 C   360 = 305D 0   500 = AF1A B   640 = 35BA 6   780 = C8DD 9   920 = 880C 1  1060 = 3CFC 2  1180 = 27E9 8  1300 = FDE1 A
90 = 98A6 3   230 = 2CCB 9   370 = 8A1E D   510 = D118 C   650 = 8189 9   790 = EB5A C   930 = 65C0 3  1070 = BB8B 4  1190 = D396 2  1310 = 2341 4
100 = 2C81 5  240 = 95B9 9   380 = D001 E   520 = 501E E   660 = 1FDF E   800 = 85FA 6   940 =    3 2  1080 = ED0F 9  1200 = 881B 8  1320 = BE75 D
110 = E421 2  250 = D134 A   390 = 8C8C 1   530 = 2C83 B   670 = B1EA 7   810 = FF3E F   950 = BE0E A  1090 = F0AC 0  1210 = A41B D  1330 = 9A87 1
120 = D3F7 2  260 = 95D7 1   400 = EEDC 5   540 = 9A0C 8   680 = 26E5 4   820 = 8189 4   960 = 1D3C 6  1100 = 2526 7  1220 = BA4F 5  1340 = 20DF 0
130 = 6043 8  270 = 4071 A   410 = D27B B   550 = DA5E C   690 = 450F 1   830 = C0A1 4   970 = ED0F D  1110 = ED0F 7  1230 = E5A3 E  1350 = ED0F 3
140 =  3E3 8  280 = 506B 7   420 = D134 0   560 = 495E 0   700 = FF1C B   840 = B1EA A   980 = D81C 6  1120 = D06C 3  1240 = BFED F
```


Ace Computing

RISC OS Euclid is the best multi-tasking 3D graphics and animation system for the Archimedes. It works like a 3D version of Draw, and now forms the centrepiece for a number of related products allowing the creation of complex animation sequences with the minimum of effort.

Mogul makes full use of **Euclid**'s unique hierarchical data structure to generate films of 3D objects with articulated motion and simultaneous camera motion.

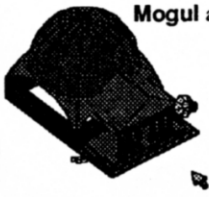
Tween produces films from Draw files. It uses techniques similar to **Mogul** and generates a film by calculating intermediate frames from a set of key positions.

Splice allows you to edit films produced by **Mogul** or **Tween**. You can even produce hand-drawn cartoons by converting sprites from any source.

Support is provided for import and export of Sprites and Drawfiles. Films can be played by the **Projector** which comes free with **Euclid, Mogul, Splice and Tween**. Films and Euclid files can be used with Genesis.

Such is the enthusiasm for **Euclid** there is now a user group called **Elements** which provides a quarterly disk containing hints, tips, animations and user pictures like the ones in this advertisement.

Euclid £70 **Mogul** £20 **Splice** £30
Tween £30 **ArcLight** £50
Ace Computing, 27 Victoria Road, Cambridge, CB4 3BW.
Tel: (0223) 322559
All prices include VAT and P&P.



Ace Computing

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BUG HUNTER/MOON DASH £17.95

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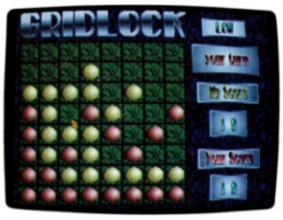

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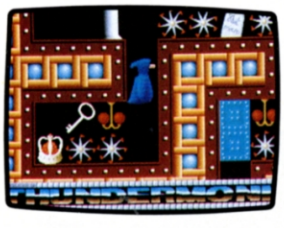

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SOFTWARE

MINERVA HOUSE, BARING CRESCENT, EXETER EX1 1TL. TEL: (0392) 437756 FAX: (0392) 421762

Cash in hand

THE multi-column cash book is a familiar item found in all offices. At the left is a column for the date, next space for a description of the entry and then up to eight columns for cash. At the end of the period you have to work out the totals by hand. However, this program will automatically add up the columns and show the running totals at the bottom of the screen.

It may be used wherever you would use a normal cash book. For example, petty cash, wages, monies received and so on. You can use it for VAT by entering the VAT part in a separate column – normally the right hand one.

Using your micro in this way has many advantages over a normal cash book. Firstly, all entries can be edited and if you make a mistake it can easily be corrected. It can sort the entries by date so that your records can always be in strict chronological order even if they were not entered that way.

And you can have as many printed copies as you like, so that you can give one to your accountant, one to the tax man, and still have the original for yourself. Plus it's much easier to read the computer's handwriting!

The program is semi multi-tasking. It installs itself on the icon bar in the normal Risc OS manner and responds to Menu and Select mouse buttons. But when you are actually making entries it takes over the whole screen and no other programs operate until you return to the DeskTop.

This approach was used for simplicity of programming rather than use the complex window environment. Because of its length the program has only been included on the Archimedes subscription disc – it will also be on the following months disc too if you haven't taken out a subscription yet.

Using the program

Double-click on the icon in the Filer window so that it installs itself on the icon bar, click Menu there to display the menu with Save, Start New and Quit options. By clicking Select on the icon you enter the main part of the program – do this and the screen clears.

At the top is the title – at this stage this will be a blank line as you haven't entered one yet. Below are the column headings, if your DeskTop is in Mode 16 there will be eight cash columns, otherwise just four.

You can edit the title and column headings at any time. Press f1 for the title. The cursor will move to the start of the title line and you can enter any text you wish, up to 70 letters.

You can move backwards and forwards along the line with the arrow keys and correct any mistakes by overtyping. When you are satisfied press Return. The column headings may be changed in the same way after pressing f2.

The centre of the screen is white and you will see a date at the top left. This is the default date for the first entry and can be changed by altering the variables in the program. To accept this date just press Return.

To accept the month and year but change the day enter the day and press Return. To accept just the year enter the day and month separated by a full stop and press Return. Alternatively you can enter day, month and year.

Each new line will start by offering the date from the previous line so that you will normally only need to press Return or enter a new day.

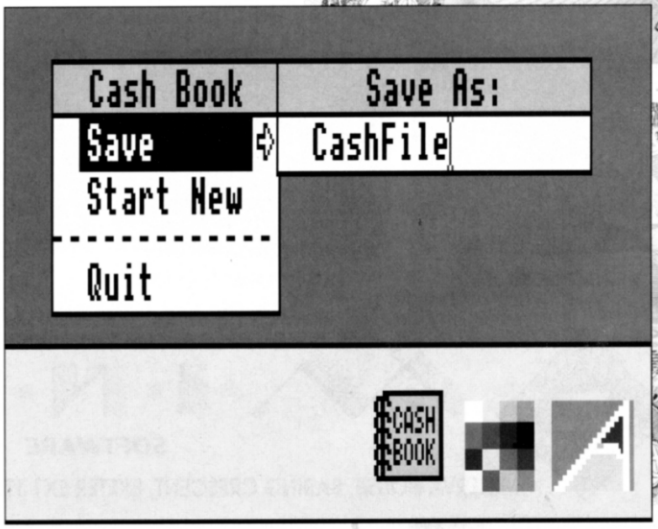
Next enter the name which can be up to 22 characters long. You can use the arrow keys and Copy to duplicate another line to save on typing. You can also use Shift+f1 to f9 to enter a previously programmed string. When you press Return after entering the name the cursor will move to the first cash column.

Use Tab to move to the next column or Backspace to move to a previous column. You can also use these keys to move back to the date or name columns and change them if you wish.

When you have positioned the cursor in the correct column enter the amount. There is no need to line the columns up with previous columns or to enter trailing zeroës. As you make each entry the program will re-align it properly for you.

Entries can be made in as many cash columns as you wish and when you finish making an entry in the right hand column or press Return you will move to the next line. As you make each cash entry the totals at the bottom of the screen will be updated.

If you wish to change an entry f3 will move up a line and f4 down. Just move to the line and make new entries. The window will scroll to reveal lines which are off screen. If you enter zero in a cash column it will be shown as blank. You can delete



Storing cash book entries

David Holden provides an aid to running small business accounts on an Archimedes

Date	Name	Column 1	Column 2	Column 3	Column 4
23. 8.90	M&J Marketing Corp		350.00		
	Sub Totals		350.00		
	Total	350.00			

The cash work page

an entire line by pressing Shift+Delete.

You can use f5 to sort all the entries by date. This is a bubble sort so it is slow – but it's very simple and quick enough as normally only a few swaps are needed.

At any time you can press Escape to return to the DeskTop and then return to your file by clicking Select on the program icon.

Printing

Pressing the Print key will send the file to the printer. If you are using Mode 16 the Epson-compatible code for condensed text will be used to set the printer to 136 columns. If you have a 136 column printer you could delete this line.

The lines are counted as they are printed and after a set number a form feed code is sent to skip over the perforations on fanfold paper.

The variable *page–length* is the number of lines printed on each page and this is set to 60 for 11 inch paper, which will leave six lines blank to avoid the perforations. If you are using 12 inch paper you can change *page–length* to 66.

To print on single sheet paper you change the variable *single–sheet* to TRUE. Printing will then stop at the bottom of each page, there will be a beep and the machine will wait for you to press space before continuing to enable you to insert a new sheet. Press Escape to abandon printing .

When printing a file the last line is never printed. This is because it is normally just the offered date for the next – incomplete – entry.

Key summary

f1	Edit Title.
f2	Edit column headings.
f3	Move up one line.
f4	Move down one line.
f5	Sort by date.
Tab	Move forwards one column.
Backspace	Move back one column.
Print	Print file.
Shift+Delete	Delete line.
Escape	Return to desktop.

Saving and Loading

To save your file return to the DeskTop, click Menu on the icon, place the pointer over Save and slide it to the right. You can alter the name and press return to save.

To load an old file drag the file icon to the Cash Book icon. If you hold down Shift while doing this it will be appended to any file already held, keeping all the headings of the first file.

The other difference when holding down Shift is that you will remain in the DeskTop after loading your file instead of going to the Cash Book screen so that you can join a number of files together.

This enables you to keep your files in handy weekly, monthly or quarterly sections and then amalgamate them into a large annual file for reference.

Clicking on Start New will wipe out any file already started after issuing a warning and begins a new file with the default settings. A better method is to save blank files with the headings you commonly use and load one of them each time you want to start a new file.

You do not need to use all four or eight columns. Any columns without entries will be shown and printed as blank and the column totals will also be blank. It is best to leave the left hand column blank as this spreads the printing across the page and gives a better appearance.

The program creates two new filetypes, CB4 and CB8, for four and eight column files respectively. You can load a four column file when using mode 16 but you can't load an eight column file in any other mode.

The user variables are located near the start of the program and may all be changed to suit your own requirements. The default filename, default directory and page length have already been mentioned.

There is also *file–size* which is the maximum number of entries permitted. This can be as high as you wish but the program will require an extra 60 bytes of ram for every entry so don't grab more than you need.

If you do increase this remember to alter the WimpSlot allocation in the !Run file accordingly. You will need an extra 4k for every 68 entries.

● *And that's about it, a simple but effective way of keeping your business cash books up to date and easily accessible.*

A QUICK PHONE CALL NOW COULD WIN YOU . . .

Household names Grundig, Hitachi, Sky and Pace combined to bring you the prize of the year – a complete stereo satellite TV system, with EVERYTHING else you need to bring you all-round TV enjoyment! Every item is right up-to-the-minute. Here is the very last word in TV technology . . . all at the touch of a button.

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Pace is Europe's largest manufacturer of satellite TV receivers and their SS9000 IRD has just about everything you might need – including a built-in videocrypt decoder for scrambled channels such as Sky Movies. It's all ready to receive the 16 extra channels of the new Astra 1b satellite – giving you 60 channels in all. It even incorporates a VCR timer that lets you pre-select different channels so that they can be recorded unattended! Remote control on-screen graphics make it simplicity to use. The 60cm dish that comes with your prize is made of a stylish black mesh which blends well with any surrounding.

..the very latest stereo satellite TV system – and ALL of these valuable additions

These are the questions:

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   a) Bell in 1900 b) Baird in 1926 c) Einstein in 1929
2. *When did commercial TV start in Great Britain?*
   a) 1955 b) 1969 c) 1970
3. *Which was the first Royal coronation to be screened on TV?*
   a) Elizabeth II b) George VI c) Edward VIII
4. *Who wrote the theme tune to the award winning film, Chariots of Fire?*
   a) Phil Collins b) Mike Oldfield c) Vangelis
5. *Which star of Wall Street is a famous son of a famous actor?*
   a) Jason Connery b) Kiefer Sutherland c) Michael Douglas
6. *Mork appeared in Good Morning Vietnam. Who is he better known as?*
   a) John Belushi b) Robin Williams c) Tom Conti

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Grundig ST55-450
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With stereo sound, the popular 21in flat square tube PLUS remote control and teletext combine with Grundig's exceptional CTI for increased colour contour sharpness, electronically eliminating colour overlap to give you a much crisper picture. The sound quality is excellent with 2x8 watts of music power, two lateral wideband speakers and two frontal tweeters. Add to this a stereo base expansion and switchable sound channels and you have the very best in 1991 TV technology.

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PLUS Latest stereo video recorder

Hitachi VT-M740
WORTH £380

The new sleek design of this two-speed front-loading remote control VCR with four video heads hides a range of features including a title making facility and audio dubbing. You can also have clean still and variable slow motion PLUS digital auto-tracking enhancing the quality of sound and picture by automatically keeping the heads and tracks aligned. Other new features are the on-screen display facility and demonstration and a child lock – proof against little fingers. This really IS state-of-the-art in video recording.

To enter, simply phone: 0898 333 530

Calls cost 33p per minute cheap; 44p per minute at all other times. ***Contest ends December 31 1990*** **Database Publications/Legion**

Five into one does go

Steve Turnbull examines a complete set of programs to handle basic requirements at home and in the office

DESKTOP Office is an integrated package for the BBC A3000 and Archimedes series consisting of a word processor, database, spreadsheet, chart drawing module and comms software – sounds familiar? Well, on the BBC Micro it might have been called Mini-Office II.

The idea behind DTO is very simple, to provide a set of commonly-needed and useful programs at a reasonable price – you could easily spend well over £500 if you bought each item individually.

No individual module is stunning in itself – 1st Word Plus is better than DTOWord, Schema is better than DTOSheet and so on – but the level of integration allows DTOBase and DTOWord to produce mail merged letters, and the other modules to transfer data, although it's not as sophisticated as Inter-Word.

The package looks like a hardback book, but opening it reveals a slim pocket on the left containing a single disc and a big pocket on the right with the chunky, spiral-bound manual of about 160 A5 pages. There's also a ready-reference sheet containing lists of commonly needed commands and a cut-out function key strip.

Booting up the disc reveals the single !DTO application, !System and a directory of data files. Double clicking on !DTO

Figure I: The DeskTop Office main icon

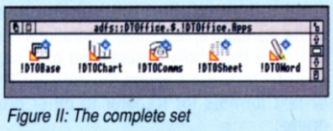

Figure II: The complete set

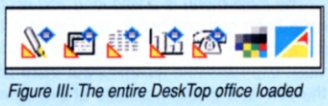

Figure III: The entire DeskTop office loaded

opens another directory window which shows the five applications (see Figures I and II). On a 1Mb machine you can only get two of the applications in memory at one time, but this shouldn't pose too much of a problem, 2Mb provides you with the ability to get everything on board – if you need it, as shown in Figure III.

Let's take a look at each package in turn.

DTOWord

DTOWord provoked a chuckle when I first started using it. I clicked up the empty window in the usual manner – it can only handle one document at a time – and started to type in some blurb. DTOWord will only handle the system font, and its printed output produces just text. So then I started looking to see how to change the styles – italic, bold or whatever – and discovered that it uses embedded codes like Wordwise.

Not only that, but you can press the function keys to specify the *start of embedded command* code – and the rest of the paragraph turned green. Somebody has a sense of humour. There is a more serious point in that it provides a level of familiarity beneficial to the more cautious user.

Product: DeskTop Office
Price: £129.95
Supplier: Minerva Software, Minerva House, Baring Crescent, Exeter EX1 1TL.
Tel: 0392 437756

One area of caution with any product that uses windows is in the area of menus – the main menu should have very few options and should be arranged intuitively. DTOWord scores well here, although five options ought to be adequate (see Figure IV).

DTOWord isn't wysiwyg, but neither was Wordwise and that didn't stop it from being the most popular third-party wordprocessor on the BBC Micro. You can use the menu system to insert the embedded commands if you want rather than doing it from the keyboard and plenty are available. Figure V shows commands being embedded from the menu.

A preview option – again like Wordwise – lets you see what your document will look like printed is available from the menu or by pressing Control+f4. There's an example in Figure VI. This option takes over the whole screen; at the end press a key to get back to the DeskTop.

As you'd expect, you can mark blocks of ➤

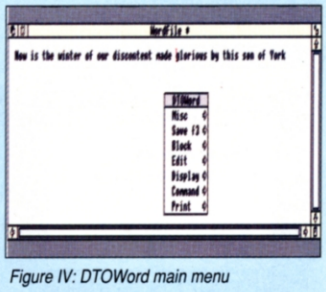

Figure IV: DTOWord main menu

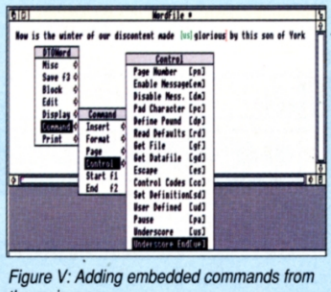

Figure V: Adding embedded commands from the main menu

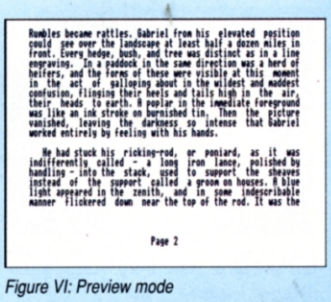

Figure VI: Preview mode

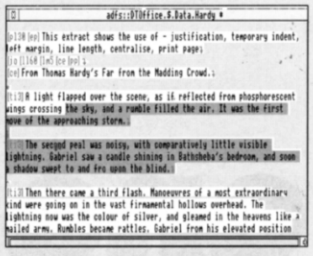

Figure VII: Highlighting a text block

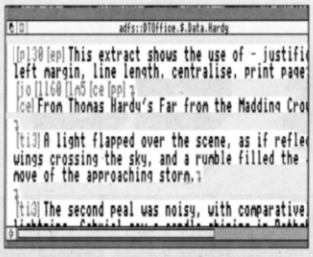

Figure VIII: Size increased for children

➤

text using the mouse – Figure VII – and perform various operations on the whole block. However the technique used is like !Edit and !PenDown in that you can move the cursor around and continue to type even when a block of text is highlighted. This method is cumbersome and makes errors easier.

One extremely useful set of block options are those for changing case. The marked section can have the case of each letter swapped, set to upper or lower case specifically or have the first letter of each word in the block capitalised and the rest lower case.

Another very useful option is the ability to increase the size of the text to make it easier for young children or the partially-sighter to use (see Figure VIII).

DTOBase

IF you are familiar with Minerva's previous database programs DTOBase will not present any surprises as it's relatively simple and fairly easy to use.

To create a new database you click on the iconbar icon then select Create from the main menu (see Figure IX). From here you can design your record layout. It's most important that you know exactly what you want – including which fields you require – before starting because changes cannot be made after you've completed the creation phase. Figures X and XI show records being created.

As you can see, you can have several different field types – Integer, decimal, date and formula. This final one allows you to calculate the contents of a field based on the values of other fields in the record.

You can load data into the file either by typing in direct or using a CSV – comma-separated value – file which can be created by hand or from another program. If there are more fields in the database record than provided in the CSV the excess ones are just left blank.

The main menu is rather overwhelming and it can take a while to get the hang of it. It is particularly confusing in that there's no save option, instead you have to go to the print option to save either as CSV or plain Ascii. A more logical name on the menu would have been Output. Changes to the database are made instantly on disc, so cannot be undone.

You can use the search options to find a particular group of records – everyone whose post code starts with LL for example – and can set individual criteria for each field. Each file found is marked, providing a subset that you can perform all subsequent operations. Alternatively you can swap and perform all operations on the unmarked files.

Movement around the files is achieved using the video-style controls or a single find command which searches for a string in all fields, as shown in Figure XII. Printing reports is done by setting up individual field criteria about order of fields to be printed and size of the field on the paper. These can then be printed or saved out as text files.

The manual covers most operations quite clearly and although this is a somewhat quirky package to use it does do its job.

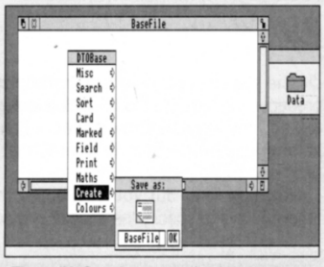

Figure IX: Creating a new database

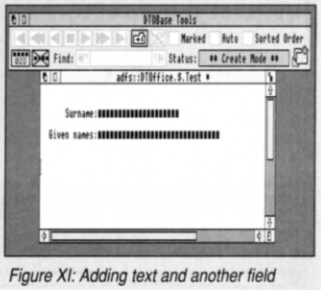

Figure XI: Adding text and another field

DTOSheet

STRANGELY the best thing to say about DTOSheet is that there's nothing that really needs to be said about it. It provides most of the standard spreadsheet operations and can save the whole spreadsheet or a portion of it as well as export the data in CSV or text formats for transfer to other programs.

Figure XIII: DTOSheet main menu

The main menu is a little long and could have been grouped better, see Figure XIII, for example the Hold option then subdivides into rows and columns, but there are the row and column options at the same level.

There are plenty of alterable options, for changing colours, how negatives are displayed, whether pound signs should be

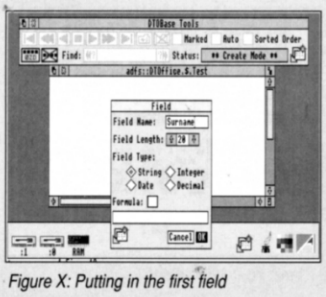

Figure X: Putting in the first field

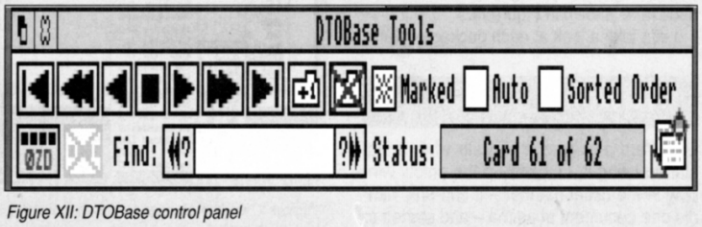

Figure XII: DTOBase control panel

shown and so on. There are basic formulae such as INT, SGN and ABS are available but there's no trigonometry. Areas of cells can be summed, counted or the minimum or maximum value in the range can be found. This really is the lowest limit of what ought to be available and there's no conditional or table look-up options.

What we end up with is something which is cosmetically excellent but only useful for the simplest of operations. Of all the modules in this package it is the weakest.

DTOChart

CREATING graphs from spreadsheet data is a common requirement nowadays and it's very easy to just port from DTOSheet to DTOChart – see Figure XIV. Alternatively you can type in the data by hand though only 20 datapoints are allowed, see Figure XVI.

Up to three sets of data can be used at the same time, and in the appropriate circumstances they can all be displayed on the same graph, the main exception being the pie chart. Each data item can be individually coloured and highlighted and in a pie chart the highlight separates out the segment.

The final graph can be scaled automatically or you can specify it directly. The results can be saved either in Graphbox format or as complete sprites for loading into other packages. I would have liked the option to save as a drawfile, but this is not a serious deficiency.

DTOComms

AS with Mini-Office, the DTOComms package is something of an odd-one-out as it doesn't integrate with others despite being a vital element in the complete set. Essentially all it does is turn the Archimedes into a terminal for linking to another computer.

However, it has a nice easy-to-use dialogue box for configuring the micro to the particular service you want to use, Figure XVII, and if you have a Hayes-compatible modem, you can also create script files to make it dial the number and log-on for you.

The complete dialogue with the remote machine is recorded in a text window and you can save it to make a permanent record of any messages sent to you, as shown in Figure XVIII.

It is an adequate program and it's difficult to see how it could have been improved.

Summing up

The weakest member of the team, DTOSheet, lets DeskTop Office down somewhat, but taken as a whole it's an excellent package for the price.

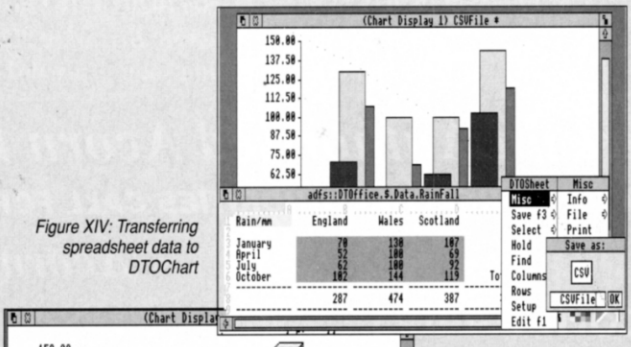

Figure XIV: Transferring spreadsheet data to DTOChart

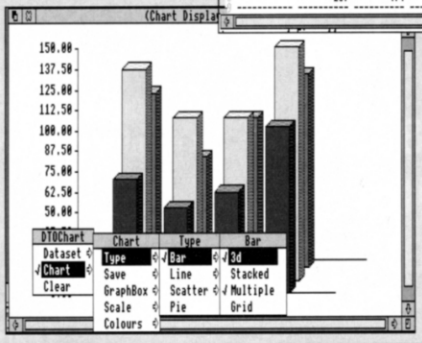

Figure XV: Some DTOChart options

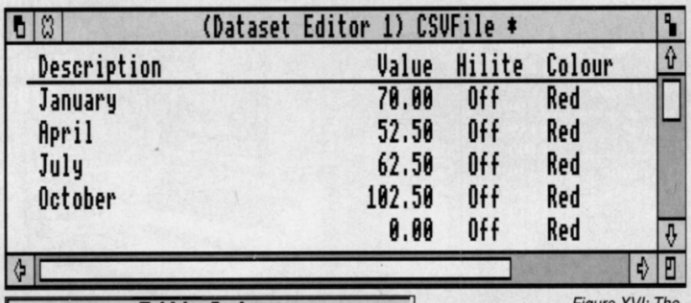

Figure XVI: The dataset editor in DTOChart

Figure XVII: DTOComms setup dialogue box

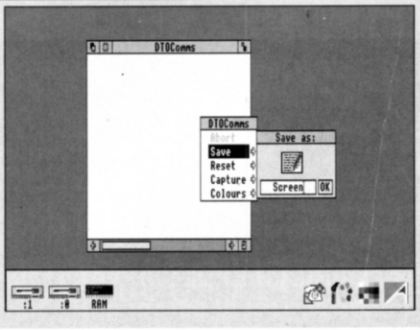

Figure XVIII: The text spooling window

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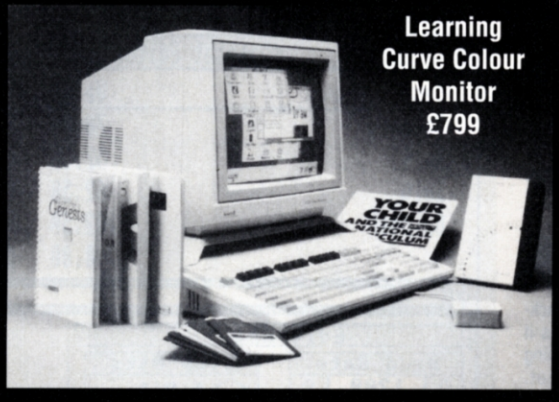

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Danger Dog

Hound those ghouls with Matthew Eastmond. Make no bones about it, this task is tough

AN ill-fated hero called Danger Dog desperately needs your help. Trapped in a ghouls' lair, his only hope of escape is a teleport machine that has run out of fuel.

To get it working again D.D. has to explore his surroundings and collect all the fuel he can lay paws on. It is stored, for some doggone odd reason, in green wine bottles.

The good news is there are four items D.D. can find and use to make his quest easier – a laser, a super high bounce, a twin-shot laser and a smart bomb.

The bad news is that the ghouls don't care what he is armed with – their aim is to chase D.D. relentlessly until they kill him.The poor hound also has to contend with poisonous plants and contaminated computers.

Life is hard. And frequently short.

Use Z and X to move D.D. left and right and Return to make use of an item. Press the left and right cursor keys to move the pointer at the bottom of the screen to the item you want select. S and Q turn the sound on and off.

Type in the two listings and ensure you've made no typing errors by using the checksums.

Save the two listings as *Danger1* and *Danger2* respectively. To get started simply CHAIN"Danger1".

Listing I

```
  1 REM Danger Dog Listing I
  2 REM by Matthew Eastmond
  3 REM (c) The Micro User
 10 ON ERROR GOTO610
 20 MODE1
 30 VDU23,1;0;0;0;0;19,2,2;0;19,3,6;0;
 40 ?&36D=&8
 50 P%=&80:[OPT2:LDA#135:JSR&FFF4:STX&
70:RTS:]
 60 ENVELOPE1,1,0,0,0,0,0,0,0,0,-9,8
0,80
 70 ENVELOPE2,2,1,-1,1,2,4,2,10,-1,0,-
1,106,70
 80 ENVELOPE3,1,0,0,0,1,1,1,60,-4,-1,-
1,99,20
 90 ENVELOPE4,1,0,0,0,1,1,1,60,-8,-4,-
5,126,60
100 ENVELOPE13,1,0,0,0,0,0,0,126,-8,-1
,-8,126,50
110 ENVELOPE14,130,0,3,-2,2,3,9,45,-30
,-5,-6,105,40
120 ENVELOPE15,0,0,0,0,0,0,0,100,-100,
-100,-100,100,0
130 FORT=0TO 1:PROCpanel:RESTORE:NEXT
140 FORT=188TO572STEP128:PROCbox:NEXT
150 T=1052:PROCbox
160 VDU24,156;908;1127;948;:CLG:VDU26
170 COLOUR131:COLOUR1:PRINTTAB(20,27);
" Danger Dog ":COLOUR128
180 PRINTTAB(9,9);"GAME BY MATT EASTMO
ND"
190 VDU23,196,8,28,38,93,218,119,9,18,
23,197,34,68,8,144,64,129,38,96,23,198,0
,33,194,8,16,34,68,8,23,199,208,96,76,14
6,32,72,40,16
200 VDU23,200,254,255,255,255,255,255,
231,64
210 VDU23,201,159,189,191,0,251,251,25
1,0,23,202,127,127,125,0,251,251,243,0,2
3,203,238,239,239,0,253,253,249,0,23,204
,239,239,207,0,249,253,253,0
220 VDU23,205,0,1,7,8,19,24,9,6,23,206
,0,192,32,96,32,16,16,224,23,207,1,57,12
5,255,237,65,1,3,23,208,134,15,159,182,2
48,128,192,224
230 VDU23,209,28,8,28,8,28,28,28,62,23
,210,62,121,121,50,28,0,0,0
240 VDU23,211,0,63,32,32,32,35,32,63,2
3,212,0,252,28,84,220,212,28,252,23,213,
15,1,31,32,74,149,128,255,23,214,240,128
,248,4,170,85,1,255
250 VDU23,215,0,63,96,112,111,104,105,
104,23,216,0,252,6,10,242,114,242,50,23,
217,104,104,119,104,95,63,0,0,23,218,242
,114,242,10,254,252,0,0
260 VDU23,220,0,0,12,124,252,140,12,12
,23,219,0,0,0,0,3,15,14,12,23,221,12,12,
12,60,124,120,0,0,23,222,12,60,124,120,0
,0,0,0
270 VDU 23,192,0,128,192,224,96,176,48
,224,23,191,0,15,63,126,124,252,206,191,
23,194,254,253,223,192,0,192,224,128,23,
193,207,249,249,248,124,127,63,15
280 VDU 23,225,0,128,124,251,223,224,2
54,0,23,224,31,54,54,123,121,125,125,59,
23,227,128,192,192,224,224,192,0,224,23,
226,7,5,13,14,15,7,3,3
290 VDU23,228,0,1,62,223,251,7,127,0,2
3,229,248,108,108,222,158,190,190,220,23
```

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```
,230,1,3,3,7,7,3,0,7,23,231,224,160,176,
112,240,224,192,192
  300 VDU23,233,199,240,115,119,195,25,1
88,30,23,234,200,12,207,239,238,224,199,
51,23,235,206,238,239,198,128,60,126,63,
23,236,240,99,115,121,248,254,14,192
  310 VDU23,233,56,84,219,45,255,251,127
,255,23,234,0,96,219,187,215,237,251,255
,23,235,124,235,255,239,255,255,221,255,
23,236,0,224,252,251,191,254,251,255
  320 VDU23,232,0,127,127,0,0,0,0,0
  330 VDU23,237,24,0,24,24,24,60,126,126
,23,238,255,252,227,28,227,31,255,126,23
,239,17,19,31,14,4,4,4,31
  340 VDU23,240,112,127,127,127,127,127,
112,0,23,241,24,28,254,255,254,28,24,0,2
3,242,15,0,31,32,31,0,15,16,23,243,240,8
,240,0,252,2,252,0
  350 VDU23,244,16,56,124,254,56,56,56,0
  360 VDU23,245,0,0,0,0,7,31,60,60,23,24
6,10,64,9,20,240,248,60,220,23,247,124,1
24,124,60,60,31,7,0,23,248,222,62,222,15
6,28,248,224,0
  370 VDU23,249,0,1,3,7,6,13,12,7,23,250
,0,240,252,126,62,63,115,253,23,251,127,
191,251,3,0,3,7,1,23,252,243,159,159,31,
62,254,252,240
  380 VDU23,253,24,24,24,24,24,24,24,24,0
```

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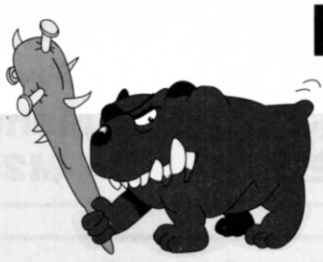
```
  390 VDU17,3,31,33,27,219,220,10,8,8,22
1,222,31,0,10
  400 IF PAGE>&1100 THEN PAGE=&1100
  410 CHAIN"DANGER2"
  420 :
  430 DEF PROCpanel
  440 RESTORE 550
  450 REPEAT:READ A%,B%,C%,D%,E%,F%,G%
  460 GCOL0,G%:MOVEA%,B%:MOVEC%,D%
  470 PLOT85,E%,F%:UNTIL A%=-1
  480 GCOL0,0:REPEAT:READ A%,X%,Y%
  490 IF A%=0 DRAW X%,Y% ELSEMOVE X%,Y%
  500 UNTIL A%=2
  510 IFT=0FORY=0TO24:VDU31,0,0,11:NEXT
  520 GCOL0,2:MOVE0,848:DRAW1280,848:MOV
E0,208:DRAW1280,208
  530 ENDPROC
  540 :
  550 DATA 128,888,128,968,1152,888,3,12
8,968,1152,968,1152,888,3,128,992,128,86
4,32,928,1,1152,992,1152,864,1248,928,1,
-1,0,0,0,0,0,0,1,128,968,0,144,956,0,113
6,956,0,1152,972,1,1136,956,0,1136,900,0
,1152,888,1,1136,900
  560 DATA 0,144,900,0,128,888,1,144,900
,0,144,956,2,0,0
  570 :
  580 DEF PROCbox
  590 GCOL0,131:VDU24,T-24;92;T+64;164;:
CLG:VDU26:GCOL0,0:MOVE T,156:DRAW T-24,1
64:DRAW T-24,92:DRAW T,92:MOVE T-24,164:
DRAW T+64,164:DRAW T+64,156:GCOL0,128:VD
U24,T;92;T+64;156;:CLG
  600 ENDPROC
  610 MODE7:REPORT:PRINT" at line ";ERL:
END
```

```
  1 =     0 0   200 =  C7D 9   420 = 9719 E
  2 =     0 0   210 =  E3D0 1  430 = FFF4 A
  3 =     0 0   220 =  D0FF 3  440 = FEF3 E
 10 = 9098 8   230 =  B108 0  450 = 99D3 6
 20 = EA3A 0   240 =  AEF1 4  460 = 7FB5 E
 30 = 15FA C   250 =  D254 C  470 = 8748 F
 40 = 9795 E   260 =  E9D3 3  480 = B461 3
 50 = 9CCE 4   270 =  D078 A  490 = 79ED 4
 60 = 7C1D 4   280 =  D073 2  500 = C78D 4
 70 = 501D B   290 =  41E7 7  510 = AC31 0
 80 = 9998 0   300 =  43B1 F  520 = D60C 9
 90 = A883 6   310 =  7868 8  530 = ED0F 4
100 = 2B8E E   320 =  5890 1  540 = 9719 3
110 = 8342 2   330 =  3323 7  550 = 9AE3 B
120 = C4B1 E   340 =  CAA6 9  560 = D157 F
130 = 4147 7   350 =  3BFB E  570 = 9719 7
140 = B9E2 5   360 =  24EF 0  580 = 81E6 0
150 = 91F1 B   370 =  721E 4  590 = E1D8 C
160 = 7702 B   380 =  F1B5 4  600 = ED0F 3
170 = 52F2 A   390 =  BCEE E  610 = 2274 9
180 = 4848 3   400 =  2399 5
190 = E7D8 5   410 =  FA46 4
```

Listing II

```
  1 REM Danger Dog Listing II
  2 REM by Matthew Eastmond
  3 REM (c) The Micro User
 10 ON ERROR GOTO 1880
 20 DIM b% 21,A$(3),J%(10),X%(3),Y%(3)
,A%(3),I%(3)
 30 PROCstart:REPEAT:PROCvars
 40 SOUND1,2,101,6
 50 PROCscreen:REPEAT:PROCsprt
 60 IF INKEY-74IF F%=0PROCset
 70 IF INKEY-17 VDU31,33,27,32,32,10,8
,8,32,32:*FX210 1
 80 IF INKEY-82 VDU31,33,27,219,220,10
,8,8,221,222:*FX210 0
 90 Z%=I%+1:IF Z%=4Z%=0:IF s%>19PROCg
100 IF F% PROCfire
110 PROCg:IF X%>37AND C%=224OR X%<1AND
 C%>224OR Y%=230R Y%=6PROCnew
120 UNTIL W%<176 OR X%=6AND Y%=19AND s
%=1AND p%=100
130 IF W%<176 PROCdie ELSE PROCend
140 UNTIL FALSE
150 :
160 DEF PROCsprt:A%=X%:B%=Y%
170 IF J%(J%)>0 PROCs
180 IF J%(J%)<0 PROCu
190 IF S%=2 IF J%(J%)<>0 IF RND(2)=1 J
%=J%-1
200 J%=J%+1:IFJ%=10J%=0:PROCchek
210 IF INKEY-98 PROCr
220 IF INKEY-67 PROCl
230 VDU17,3,31,A%,B%,32,32,10,8,8,32,3
2,31,X%,Y%,C%,C%+1,10,8,8,C%+2,C%+3
240 IF INKEY-122IF F%=0IF x%<16VDU31,x
%,30,32:x%=x%+4:PROCw:ENDPROC
250 IF INKEY-26IF F%=0IF x%>10VDU31,x%
,30,32:x%=x%-4:PROCw
260 ENDPROC
270 :
280 DEF PROCr:VDU31,X%-1,Y%:CALL&80:VD
U10:IF ?&70<>32 PROCd:ENDPROC
290 CALL&80:IF ?&70<>32PROCd:ENDPROC
300 X%=X%-1:C%=228:ENDPROC
310 DEF PROCu:VDU31,X%,Y%-1:CALL&80:VD
U9:IF ?&70<>32 J%=6:PROCd:ENDPROC
320 CALL&80:IF ?&70<>32 J%=6:PROCd:END
PROC
330 Y%=Y%-1:ENDPROC
340 DEF PROCs:VDU31,X%,Y%+2:CALL&80:VD
U9:IF ?&70<>32 J%=0:SOUND0,13,3,1:PROCd:
ENDPROC
350 CALL&80:IF ?&70<>32 J%=0:SOUND0,13
,3,1:PROCd:ENDPROC
360 Y%=Y%+1:ENDPROC
370 DEF PROCl:VDU31,X%+2,Y%:CALL&80:VD
U10:IF ?&70<>32 PROCd:ENDPROC
380 CALL&80:IF ?&70<>32 PROCd:ENDPROC
390 X%=X%+1:C%=224:ENDPROC
400 :
410 DEF PROCd
420 IF ?&70>152 AND ?&70<157 OR ?&70>1
90 AND ?&70<195 OR ?&70=159 OR ?&70>204
AND ?&70<209 OR ?&70>210 AND ?&70<215 SO
UND0,4,4,1:PROClife
430 IF ?&70>140 AND ?&70<144 VDU31,c%,
c1%,32,32,10,8,8,32,32,17,2:SOUND3,3,200
,1:PROCp:b%?s%=0
440 IF ?&70>143 IF ?&70<146 IF s%>1 PR
OCt(1)
450 IF ?&70>143 IF ?&70<146 IF s%=1 PR
OCt(0)
460 IF ?&70>145 IF ?&70<148 PROCt(2)
470 IF ?&70>148 IF ?&70<153 PROCt(3)
480 ENDPROC
490 :
500 DEF PROCt(Q%):IF Z%(Q%)>0 ENDPROC
510 Z%(Q%)=1:SOUND1,3,100,1:PROCextra:
PROCp:ENDPROC
520 DEF PROCchek
530 J%=0:VDU31,X%,Y%+2:CALL&80:VDU9:IF
 ?&70<>32 SOUND0,13,3,1:PROCd:ENDPROC
540 CALL&80:IF ?&70<>32 SOUND0,13,3,1:
PROCd:ENDPROC
550 J%=6
560 ENDPROC
570 :
580 DEF PROCg
590 I%=X%(Z%):K%=Y%(Z%):IFX%(Z%)=99FOR
T=0TO15:NEXT:ENDPROC
600 IF X%(Z%)<X% PROCgr
610 IF X%(Z%)>X% PROCgl
620 IF Y%(Z%)>Y% PROCgu
630 IF Y%(Z%)<Y% PROCgd
640 VDU31,I%,K%,32,32,10,8,8,32,32,17,
2,31,X%(Z%),Y%(Z%):IF I%>X%(Z%) VDU249,2
50,10,8,8,251,252 ELSE VDU191,192,10,8,8
,193,194
650 ENDPROC
660 DEF PROCgl:VDU31,X%(Z%)-1,Y%(Z%):C
ALL&80:IF ?&70<>32 ENDPROC
670 VDU10:CALL&80:IF ?&70<>32 ENDPROC
680 X%(Z%)=X%(Z%)-1:ENDPROC
690 DEF PROCgr:VDU31,X%(Z%)+2,Y%(Z%):C
ALL&80:VDU10:IF ?&70<>32 ENDPROC
700 CALL&80:IF ?&70<>32 ENDPROC
710 X%(Z%)=X%(Z%)+1:ENDPROC
720 DEF PROCgu:VDU31,X%(Z%),Y%(Z%)-1:C
ALL&80:VDU9:IF ?&70<>32 ENDPROC
730 CALL&80:IF ?&70<>32 ENDPROC
740 Y%(Z%)=Y%(Z%)-1:ENDPROC
750 DEF PROCgd:VDU31,X%(Z%),Y%(Z%)+2:C
ALL&80:VDU9:IF ?&70<>32 ENDPROC
760 CALL&80:IF ?&70<>32 ENDPROC
770 Y%(Z%)=Y%(Z%)+1:ENDPROC
780 DEF PROCw:VDU17,3,31,x%,30,244:L%=
0:S%=9:IF Z%(((x%+1)/4)-2)=0 ENDPROC
790 S%=((x%+1)/4)-2:SOUND2,1,200,1:FOR
T=0TO99:NEXT:ENDPROC
800 :
810 DEF PROCfire
820 VDU31,F%,H%,32:IF S%=1VDU10,8,32
830 VDU31,F%+6%,H%:CALL&80
840 IF ?&70<>32 PROCex:ENDPROC
850 IF S%=1 VDU10:CALL&80:IF ?&70<>32
PROCex:ENDPROC
860 F%=F%+6%:VDU17,2,31,F%,H%:IF S%=4
VDU253 ELSE VDU232
870 IF S%=1 VDU10,8,232
880 IF F%>370RF%<2VDU31,F%,H%,32:F%=0:
```



```
IF S%=1 VDU10,8,32
  890 ENDPROC
  900 :
  910 DEF PROCex
  920 F%=F%+6%:FORT=0TO3:IF F%>X%(T)-2 I
F F%<X%(T)+3 IF H%=Y%(T) OR H%=Y%(T)+1 P
ROCb
  930 NEXT:F%=0
  940 ENDPROC
  950 :
  960 DEF PROCset
  970 IF X%>35 AND C%=224 ENDPROC
  980 IF S%=3 IF Z%(3)<9 FORT=0TO3:PROCb
:NEXT:Z%(3)=9:PROCextra
  990 IF S%>1ENDPROC
 1000 H%=Y%:IF C%=224 G%=2:F%=X%+2 ELSE
G%=-2:F%=X%-1
 1010 VDU31,F%,H%:CALL&80:VDU10
 1020 IF?&70<>32PROCex:ENDPROC
 1030 IFS%=1CALL&80:IF?&70<>32PROCex
 1040 IF S%=0SOUND2,14,110,1ELSE SOUND2,
14,200,1
 1050 ENDPROC
 1060 :
 1070 DEF PROCb:IF X%(T)=99 ENDPROC
 1080 SOUND0,4,6,1:VDU17,1,31,X%(T),Y%(T
),196,197,10,8,8,198,199:FORY=0TO169:NEX
T:VDU31,X%(T),Y%(T),32,32,10,8,8,32,32:I
F s%<19 X%(T)=99:ENDPROC
 1090 :
 1100 DEF PROCextra
 1110 A=0:FORT=6TO18STEP4
 1120 VDU31,T,27,32,32,10,8,8,32,32
 1130 IF Z%(A)=1 PRINTTAB(T,27);A$(A)
 1140 A=A+1:NEXT:PROCw:COLOUR2
 1150 ENDPROC
 1160 :
 1170 DEF PROClife
 1180 GCOL0,0:MOVE W%,916:DRAW W%,940
 1190 W%=W%-16
 1200 ENDPROC
 1210 :
 1220 DEF PROCp:p%=p%+4:PROCtyp(STR$(p%)
+"%",33,30):ENDPROC
 1230 DEF PROCnew
 1240 IF X%=38 s%=s%+1:X%=1
 1250 IF X%=0 s%=s%-1:X%=37
 1260 IF Y%=6 s%=s%-7:Y%=22
 1270 IF Y%=23 s%=s%+7:Y%=7:J%=6
 1280 PROCscreen:ENDPROC
 1290 :
 1300 DEF PROCend
 1310 SOUND0,2,4,9
 1320 FORY=0TO7:VDU17,3,31,6,19,224,225,
10,8,8,226,227:FORT=0TO499:NEXT:VDU31,6,
19,228,229,10,8,8,230,231:FORT=0TO499:NE
XT:NEXT
 1330 VDU31,6,19,32,32,10,8,8,32,32,28,0
,24,39,6,12,26:SOUND1,4,200,1
 1340 PROCtyp("YOU HAVE ESCAPED",12,13)
 1350 FORT=0TO4999:NEXT:hp%=100
 1360 ENDPROC
 1370 :
 1380 DEF PROCscreen
 1390 VDU19,2,2;0;19,3,6;0;19,1,1;0;28,0
,24,39,6,12,26:IF s%>14 VDU19,1,5;0;19,3
,4;0;
 1400 RESTORE 1810:IF s%>1 FORT=1TO s%-1
:READ A$:NEXT
 1410 READ A$:b%=ASC(MID$(A$,1,1))-46:c%
=ASC(MID$(A$,2,1))-46:c1%=ASC(MID$(A$,3,
1))-46:IF b%?s%=1 VDU31,c%,c1%,17,2,237,
10,8,238,239
 1420 FORP%=4 TO LEN(A$)STEP4:X=ASC(MID$
(A$,P%,1))-46:Y=ASC(MID$(A$,P%+1,1))-46:
X1=ASC(MID$(A$,P%+2,1))-46:K=ASC(MID$(A$
,P%+3,1))-46
 1430 IF K=1 VDU17,2:FORA%=X TO X1 STEP4
:VDU31,A%,Y,233,234,235,236:NEXT
 1440 IF K=2 PROCa(X,211,3)
 1450 IF K=3 VDU17,1:FORA%=X TO X1 STEP2
:VDU31,A%,Y,201,202,10,8,8,203,204:NEXT
 1460 IF K=4 PROCa(Y,201,1)
 1470 IF K=5 FORA%=X TO X1 STEP3:VDU17,1
,31,A%,Y,205,206,10,8,8,17,2,207,208:NEX
T
 1480 IF K=6 VDU31,X,Y,17,3,209,9,209,10
,8,8,8,210,9,210
 1490 IF K=7 PROCa(X,215,3)
 1500 IF K=8 PRINTTAB(X,Y);A$(X1)
 1510 NEXT
 1520 IF s%=1 COLOUR2:PROCtyp("TELEPORT"
,3,17)
 1530 F%=0:FORT=0TO3:X%(T)=99:NEXT:IF D%
>0 RESTORE 1550:FORT=1TO D%:READ X%(T-1)
,Y%(T-1):NEXT
 1540 ENDPROC
 1550 DATA 18,14,30,10,20,13,22,10
 1560 :
 1570 DEF PROCa(I%,B%,K%):VDU17,K%:FORA%
=I% TO X1 STEP2:IF I%=X VDU31,A%,Y ELSE
VDU31,X,A%
 1580 VDU B%,B%+1,10,8,8,B%+2,B%+3
 1590 NEXT:ENDPROC
 1600 :
 1610 DEF PROCdie
 1620 FORT=-1TO-15STEP-1:SOUND0,T,6,1:NE
XT:FORT=0TO999:NEXT:VDU31,X%,Y%,17,1,196
,197,10,8,8,198,199:SOUND0,4,6,1:PROCtyp
("GAME  OVER",15,13)
 1630 FORT=0TO2999:NEXT:VDU28,0,24,39,6,
12,26:PROCtyp("BEST %AGE:"+STR$(hp%),14,
11):PROCtyp("YOUR %AGE:"+STR$(p%),14,9):
IF p%>hp% hp%=p%
 1640 ENDPROC
 1650 :
 1660 DEF PROCstart
 1670 A$(0)=CHR$17+CHR$1+CHR$240+CHR$241
:A$(1)=CHR$17+CHR$1+CHR$240+CHR$241+CHR$
10+CHR$8+CHR$8+CHR$240+CHR$241:A$(2)=CHR
$17+CHR$2+CHR$242+CHR$243+CHR$10+CHR$8+C
HR$8+CHR$242+CHR$243
 1680 A$(3)=CHR$17+CHR$1+CHR$245+CHR$246
+CHR$10+CHR$8+CHR$8+CHR$247+CHR$248:hp%=
0
 1690 ENDPROC
 1700 :
 1710 DEF PROCvars
 1720 FORT=0TO3:Z%(T)=0:NEXT:GCOL0,1:FOR
W%=192 TO1088STEP16:SOUND0,15,4,1:MOVEW%
,916:DRAWW%,940:IF W%>300 GCOL0,2
 1730 NEXT:PRINTTAB(0,30);SPC(39)
 1740 S%=9:I%=0:s%=1:X%=8:Y%=11
 1750 J%=0:C%=224:p%=0:x%=7
 1760 VDU17,3,31,x%,30,244:RESTORE1800
 1770 FORT=0TO9:READ J%(T):NEXT
 1780 FORT=1TO21:b%?T=1:NEXT:PROCextra:C
OLOUR3:PROCtyp("PRESS  SPACE",14,14):REP
EAT UNTIL INKEY-99
 1790 ENDPROC
 1800 DATA -2,-1,-1,-1,0,0,1,1,1,2
 1810 DATA .9;.CH1.EU10=?1CAH1.<61L=S1.4
U1G@G3D6U1:6.4.5C22:.6,2F<.EU12>F1.6U1.4
U1D8@2N@U1IC.3M>.32>@2:<>0,04>.E416FU/.@
41>DU3A@A1L@U1.6U17DO6TBT1,2OD.FU/.@D2.4
U1A6.4
 1820 DATA OHC.F6/6EU1DAE2F?C2R?C2LCL3.4
U1,2PC.EU12EQ/.?C28CL3.4U1T?E2A6.4,2R=.?
61.E61.4U1T5E2B?R1.?E2H=NO,229.4U1.5E2OE
U1OCU3N?P1D;F12;<1
 1830 DATA 2@6.4U1.CU1B682D<C2F<L1@8@1>A
>3FAJO,2F9.C61.EB1.4U1HEU1B?C2D?J1D;U1F6
F43A63,259.E<1.4U1.;8185;2<CB1BAH1H?P1P=
U1J=NOB?E38C/6,2B=.=81.?81.4U1B?B1J=U1J?
U1A6.4
 1840 DATA 2C=.=E22EU12EU/O=E2.4U1F5=2>?
F1,.R:.EU1.4618:<OT4D264>28<>18>>1@CS1BA
SOR<R1,O1C.5C2.EU54CH34;C2:?C2.4U5CAC2,1
1C.445.E4546<54C<5<8B5<AB5D:U5D?U56A16
 1850 DATA 1N=.?U5.:@5B482.4B1H482H4U1J:
U5D=DO,2F;.EU5.DU/.4U5.?C2.6:2B6.4:=>5B=
F5OBF3
 1860 DATA 2BB.DU52@P56>L56>L/7<<3,16@.D
U5.4U56BU5>@U5F>U5N<U5A6.4@>DO,2Fa1BQ3OD
P/R6D2.<D2.ES5.4$5O<81H>R1
 1870 DEF PROCtyp(A$,x%,y%):LOCAL A%,N%,
X%,Y%:X%=&70:Y%=0:A%=10:FOR N%=1 TO LEN(
A$):?&70=ASC(MID$(A$,N%)):CALL &FFF1:VDU
23,223,0,?&71,?&73,?&74,?&75,?&77,?&78,0
,31,x%+N%-1,y%,223:NEXT:ENDPROC
 1880 MODE7:REPORT:PRINT" at line ";ERL:
END
```

```
   1 =     0 0   620 = 9280 E  1260 = EE9F 9
   2 =     0 0   630 = F073 2  1270 = 7BE6 C
   3 =     0 0   640 = B85F 5  1280 = 5714 A
  10 = B089 9   650 = ED0F F  1290 = 9719 1
  20 = F4B6 4   660 = 3723 2  1300 = E4FA D
  30 = 4C93 F   670 = 2A60 F  1310 = 936B 9
  40 = B02B 2   680 = 270A D  1320 = 547E E
  50 = 40E6 A   690 = 19DA 7  1330 = 6063 0
  60 = 4EA8 9   700 = 121A A  1340 = 931E 3
  70 = 5C9B 2   710 =   93 A  1350 = F111 6
  80 = 2F7F B   720 = 750E 1  1360 = ED0F 8
  90 = 49FF 5   730 = 121A 6  1370 = 9719 E
 100 = 123B 3   740 = 58AD F  1380 =  3F6 3
 110 = 4D8B 9   750 = E712 9  1390 = CDCA E
 120 = DB4B 2   760 = 121A 2  1400 = 3DFF 9
 130 = FB63 3   770 = 7F34 C  1410 = 3151 1
 140 = 226C 9   780 = DE93 2  1420 =   F1 7
 150 = 9719 6   790 = D566 E  1430 = 79FF E
 160 = 7A35 5   800 = 9719 2  1440 = 18D0 8
 170 =  A0F 4   810 = CC30 C  1450 = DCEC 4
 180 = 2E4A 9   820 = 3304 7  1460 = 1C86 A
 190 = 9A12 C   830 = 58A0 2  1470 = DC2E B
 200 = EEAA 4   840 = 5C89 4  1480 = ED06 0
 210 = 323D E   850 = 31BB F  1490 = 9232 6
 220 = 7DD5 5   860 = DCFD 0  1500 = DA82 3
 230 = 73F5 E   870 = 4A76 5  1510 = 2C83 0
 240 = B2B0 C   880 = B59C 9  1520 = 7C78 7
 250 = 6CDD 6   890 = ED0F 6  1530 = FB9E 1
 260 = ED0F 9   900 = 9719 8  1540 = ED0F 9
 270 = 9719 7   910 = A7A4 D  1550 = 4C12 1
 280 = 7628 0   920 = F415 D  1560 = 9719 1
 290 = 44FA 3   930 = EE92 8  1570 = A519 5
 300 = F569 4   940 = ED0F F  1580 = 89C5 A
 310 = 804F 2   950 = 9719 A  1590 = E531 7
 320 = 3071 4   960 = DBF2 8  1600 = 9719 D
 330 = A633 D   970 = F180 9  1610 = 5A7C 1
 340 = BC3F 0   980 = FED6 6  1620 = CF45 2
 350 = F8AA 2   990 = 414B F  1630 = 9888 4
 360 = 81AA 7  1000 = F1BD 9  1640 = ED0F B
 370 = C638 1  1010 = BB6F 2  1650 = 9719 9
 380 =  13A E  1020 = 21DF B  1660 = 9328 2
 390 = 71FC 0  1030 = 3128 4  1670 =   56 B
 400 = 9719 F  1040 = EA4B 4  1680 = 8B27 E
 410 = 4EC2 8  1050 = ED0F 1  1690 = ED0F F
 420 = 9B26 0  1060 = 9719 3  1700 = 9719 5
 430 = 3877 C  1070 = A894 B  1710 =  CC1 0
 440 = C36F F  1080 = D891 D  1720 = B81C 5
 450 = 382B 3  1090 = 9719 0  1730 = 2891 B
 460 = 6DE2 6  1100 = FFC2 1  1740 =  5A0 9
 470 = A3D6 4  1110 = D4CB 4  1750 = DD73 5
 480 = ED0F D  1120 = 1655 9  1760 = 2237 5
 490 = 9719 4  1130 =  BC9 1  1770 = FD6E D
 500 = 502B 3  1140 = 2D7A 2  1780 = 80A3 A
 510 = F794 4  1150 = ED0F 6  1790 = ED0F 4
 520 = 3C6F 1  1160 = 9719 9  1800 =  8B2 0
 530 = 833D 2  1170 = 6B2C E  1810 = D569 6
 540 = A1AD 1  1180 = 6EEF 9  1820 = 61A7 5
 550 = 4E5D D  1190 = 27A9 7  1830 = FD89 1
 560 = ED0F D  1200 = ED0F 0  1840 = B495 1
 570 = 9719 D  1210 = 9719 9  1850 = FB99 1
 580 = 7EA1 3  1220 = 8B79 D  1860 = 39E6 E
 590 = F013 A  1230 = EAA3 E  1870 = B7C7 9
 600 = 8247 B  1240 = 706B C  1880 = 2274 7
 610 = 115B 8  1250 = A025 3
```

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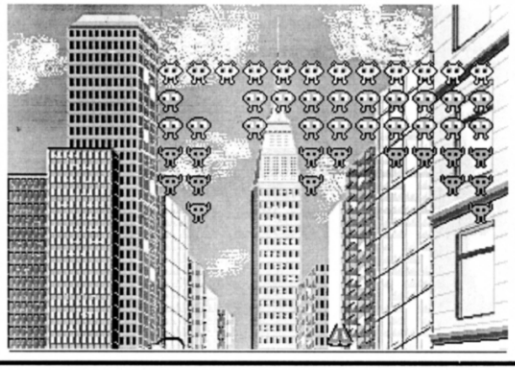

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All operations can be performed from the RISC OS desktop, with the DFS disc appearing on the icon bar in the normal way, and displaying its files in a window. Alternatively, the facilities are all available as 'star' commands. ArcDFS is fully compatible with the BBC 6502 emulator. Many additional features are built into the system such as the ability to set up virtual DFS drives on an ADFS hard or floppy disc, and a DFS ramdisc.

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This book is the perfect introductory guide to the Archimedes, to guide you through the first few months of ownership, acting as an easy-to-read supplement to the User Guide.

The book describes in detail how to put the RISC OS Desktop to best use, and also documents the programs on the Applications Discs provided with the machine.

But the book also goes beyond this and describes the sort of software and hardware additions available to the Archimedes owner, and how to choose and install them.

The many features of this book include:

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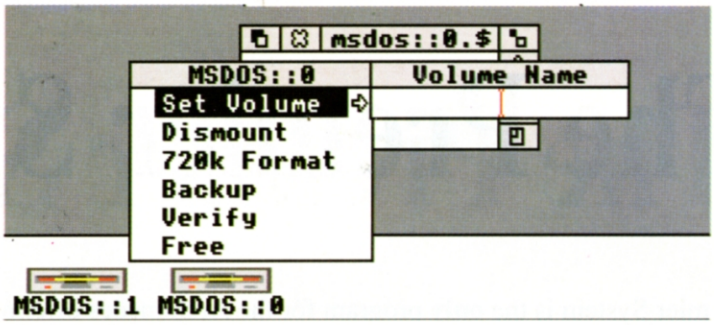


PC Access main menu

Breaking the PC barrier

Product: PC Access
Price: £39.95
Supplier: Minerva Software, Minerva House, Baring Crescent, Exeter, Devon EX1 1TL.
Tel: 0392 437756
Requirements: BBC A3000 or Archimedes series

Steve Turnbull examines a new product for inter-micro communication

OWNERS of the PC Emulator for Acorn's 32 bit micros may have discovered the barely-mentioned programs PutFile and GetFile, which allow them to load and save to ADFS discs from the PC environment. But having to enter the emulator just to transfer PC data to Risc OS is very inefficient, so Minerva have come up with an effective solution.

PC Access is a utility that simply provides access to PC discs but, unlike such predecessors as !PCdir, it provides a proper Filer module which behaves identically to the ADFS or RAM filing systems.

This means that not only can you load and save directly to PC discs from any program, but you can also randomly access its files – the interface is completely standard.

Double-clicking the !PC-Access icon from its Filer window results in the number of disc drive icons you have doubling – each ADFS drive is duplicated by an MSdos drive. If you have a hard disc you can also access any Dos partition with equal ease.

If you insert a 3.5in 720k PC disc in drive zero and click the MSDOS::0 icon you get a proper Filer window with the usual menu options available on each file.

One major difference between ADFS and MSdos is file typing. The ADFS puts the file type into the hidden load/execute address areas, while in MSdos it becomes part of the file name as the *file extension*.

In MSdos the following names are distinct and could exist in the same directory:

```
FRED.TXT
FRED.WKS
FRED.ARC
```

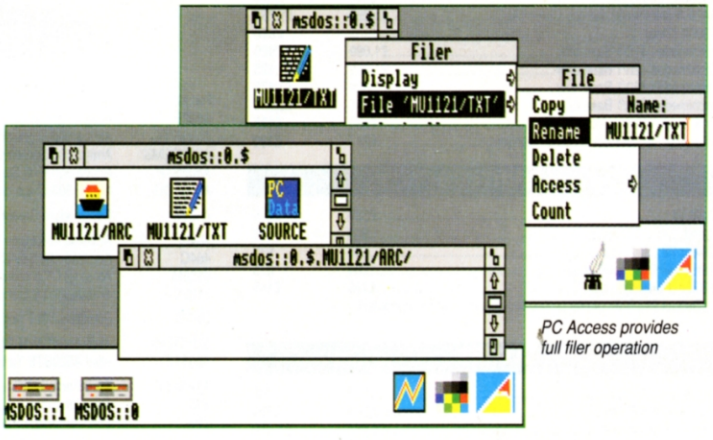
The first is text only, the second is a Lotus 1-2-3 file while the last is an archive. In Risc OS each would have to have a different name as well as a different file type if they were in the same directory.

PC Access gets around this problem by adding the file extension to the name, seperated by a slash. Hence the examples become FRED/TXT, FRED/WKS and FRED/ARC. This system works well unless you have the maximum permitted 11 character MSdos file names ,at which point the / is omitted.

To ensure that the icons in the Filer window match the standard Risc OS ones, PC Access maintains a translation table which is used check the MSdos extension and attempts to match it with a Risc OS file type. If a match is found the proper icon – text, archive or whatever – is displayed in the window otherwise a special PC data icon is shown.

You can create your own temporary file type translations using system variables or edit the translations text file located in the !PC-Access directory for permanent additions or deletions.

Up to now !PCdir was part of my arsenal but I now use PC Access all the time. It makes file transfers extremely easy – in fact it's quite indispensible.



PC Access provides full filer operation

Summing up

PC Access is a utility with a very simple concept but very far-reaching effects. Not only does it put you in touch with the entire PC community, but also any other system that can read MSdos discs – like a Mac II with the Apple File Exchange software. Excellent value.

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PROBLEM Solved

Your technical questions answered by MIKE COOK

Topics on the agenda...

- High resolution monitors
- Connecting BBC Micros
- Converting 40 to 80 track drives
- Printer mayhem
- Mouse compatability
- VGA sync clarified
- Testing joystick response
- Adding sampled sound
- Running BBC code on a Archimedes
- Fan project

Reviewing Ascii

I HAVE recently bought an Epson LX-400 printer, but I've been unable to produce decent printouts. I've tried adjusting both micro and printer to no effect.

The printer passes the tests specified by the manual but when I try to print a View file from my BBC Master Compact it ignores the spaces and paragraphs, and replaces numbers and punctuation marks with letters.

Changing the dip switches has no effect. Please help I'm at my wits end. **– J. Kelly, Dundee.**

● *Examining the printout you sent me I can see that a full stop converts to an M and a space to a single quote mark. If you look up the Ascii codes of these characters you'll see something interesting:*

ASCII	Character
0010 0000	space
0110 0000	single quote
0010 1110	Full stop
0100 1101	M

From the space and the quote you might think that it's simply the cable that has bit 6 held high due to a bad connector, but if you look at the other mistake you'll see that it isn't that simple.

A complication exists as View uses a translation table for generating control codes. This table is often refered to as a printer driver.

To test the printer go to Basic and get your printer to print out the whole alphabet including control codes by typing VDU2 and then all the letters. These will be printed when you press return – you can ignore the Mistake *message generated by Basic.*

Examine what you have on your printout and convert each character to binary. If there is a consistent error the problem is with the cable. If not it is your View printer driver which is at fault.

Come in Number Two

MY local amateur dramatics society has an ageing intercom system which I would like to replace with a link between two BBC Masters for passing simple messages. Can you give me any advice? **– Richard Edwards, Swindon.**

● *It's simple to link two BBC Micros using the serial link. Make up a lead connecting the two computers, making sure that the CTS on one computer goes to the RTS on the other. Also that the data TX goes to the data RX and vice versa.*

*You must ensure that both your computers are set to the same baud rate using *FX8,X and *FX7,X where X indicates the baud rate.*

*Now to send between the computers use the command *FX3,1 before you print it on your screen and *FX3,0 when you have finished.*

*To receive use *FX2,1 followed by an INPUT m$ and finally a *FX2,0. You can now print the message m$.* This can be easily converted into a program to display what is being typed on the other machine.

High resolution and Multi-scan

I AM combining photographs with computer graphics to create composite images which I can photograph and print.

However, I want to upgrade my Archimedes monitor to a high resolution multi-scan one so I can use Mode 21. It is important that I need a tube with a clear front surface similar to my present Microvitec to avoid getting a double image. Can you suggest a suitable monitor? **– D.G. Christee, Cheltenham.**

● *Microvitec manufacture a wide range of monitors and, as they are made in the UK, they will probably have what you need in stock – but it won't be cheap. As an alternative, why not project the image into one of the new colour video digitisers?*

Mouse trap

IN October 1989 I upgraded from an issue 7 BBC B to an Archimedes A440/1. Then I went through the laborious task of copying all my old Beeb software to 3.5in ADFS.

Nidd Valley's Digimouse package loaded properly and appeared to work, but I couldn't use my Archimedes mouse to input. Is there any way I can make my Archimedes mouse work? **– Martin Stevens, Quinton.**

● *I assume you are using your Archimedes in the BBC Emulator mode. The Digimouse attaches to the user port so the software looks there for the mouse signals.*

It might be possible to make this package work with the original mouse if you have Acorn's input/output podule. However, the actual way Nidd Valley wrote the code may prevent this.

In theory it's possible to write a patch to

Hardware repair or software poke?

I HAVE a second hand Archimedes 310, which I've upgraded with Risc OS. However, when I removed Arthur I managed to damage some of the tracks beneath the chip on the far right – as viewed from the front. Though I had this mended, a problem has occurred which may be related.

When using a program that reads the status of the printer port using the ADVAL(-4) function, the program always fails with the error "printer unconnected/offline".

The program is written in Basic, downloaded from BBC Teletext and running in native mode on the Archimedes. The program runs perfectly in every other respect and when I removed the offending code it will also printout.

However, I'm worried that should I buy a commercial DTP package which uses this technique then the same problem will occur. **– Anthony Baker, Warrington.**

● *The error message is being generated by the program not the hardware, therefore it's difficult to tell what it is objecting to. The command ADVAL(-4) returns a value of 63 on the BBC Micro and 1023 on the Archimedes, indicating free space in the printer output buffer.*

What might be happening is that the program is sending a few characters to the printer then looking at the buffer and on seeing that there is more that 62 characters free thinks that there is no printer connected.

You can check this by looking at the program, but don't worry there is nothing wrong with your computer – anyway professional DTP packages on the Archimedes don't use this method to check for the printer.

➤ *translate the Archimedes mouse movements into a suitable form, but it would require the original programmer's cooperation.*

Double or single

UNTIL recently I didn't realise that I had a double sided disc drive, so I was quite happy using drive 0.

However, I decided to inspect the other drive but when trying to access it the drive access light doesn't glow. If I tried *.2 the motor revolves but when I typed *.1 the computer locks up. Can you help? **– A.J. Dobson, Wrexham.**

● *If you have a double-sided drive, you must format the second side before it's catalogued.*

The second side is considered to be a totally separate disc system. However, as the drive access light doesn't glow, I doubt you have a double-sided drive. The drive motor will still turn as the motor control line is common when you try to catalogue drive 2 on a single sided drive.

Watch this space

I AM working on a computer project which will help young children to identify pictures of different animals.

I would like to know if any sound sampling hardware is available for a BBC Micro as I thought sampled animal noises would be a great aid. **– J. Pearmain, Barnsley.**

● *There was a sound sampling system published in the December '86 issue of* The Micro User *by Ian McLeod.*

This allowed sampled sound to be played back though the computers sound chip. You will need special hardware to generate samples but they can be played back on any system.

Unfortunately, the quality of sound wasn't good as it tended to suffer from spurious signals.

In response to this and similar questions, I have looked again at this article and I'll be publishing modifications which considerably improve the quality, in a future Body Building article.

40 to 80 track

I HAVE two old PC disc drives – one from Teac and one from Canon. They both operate as 40 track drives on my BBC B.

However, I would like to convert them to 80 track drives is it possible? **– Jim Fitzsimmons, London.**

● *To convert a 40 track to an 80 track drive, you'll need to remove the read/write head and replace it with a half width one. In addition you'll also have to alter the gearing on the stepping actuator – this can be done electronically on some designs.*

This will cost you a lot more than a new 80 track drive, always assuming that you can get hold of the parts.

The return of two syncs

ABOUT a year ago, I got a high-quality VGA monitor for my Archimedes. I didn't do my homework and found that the Archimedes doesn't support VGA modes as it outputs only composite sync and the monitor requires separate syncs.

Therefore, I was overjoyed to read the your recent article. I did notice that the circuit diagram didn't include the RGB return signals from the VGA monitor. Should these be grounded and the black clamping level be adjusted? **–Jim Browning, Bishops Lydeard.**

● *The RGB return signals should be ignored as long as there is one earth connection between them.*

As to the black level clamping this is not really an issue, as it is only a process that is performed on composite video signals to ensure that the black level is preserved when AC coupling a composite video signal.

Taking the joy from stick

I OWN an Issue 7 BBC B, but the joystick control will not work. I bought a new joystick but that didn't help and it was suggested that the chip controlling that circuit was faulty.

I then bought a replacement chip but there was no improvement. What can I do now? **–A. P. McDougall, Fulham.**

● *To test the joystick plug it in and run the following program:*

```
10 CLS
20 PRINT ADVAL(1) DIV 64
30 PRINT ADVAL(2) DIV 64
40 PRINT ADVAL(0) AND 3
50 GOTO 10
```

You'll see three numbers at the top of the screen. With the joystick centred they should both be about 512. When the joystick is moved the top two will change to 1023 or a number below 10 depending on the direction.

The final number will change when you press the fire button. If this works your problem might lie with the software not accepting a joystick or not being initialised properly.

Mike Cook fan club

I have decided to design a prototype fan to combat overheating as my GCSE project for my CDT Design and Communication exam.

Where can I find a small, quiet fan that can be converted to run on the computer's 5 Volt supply? Would one of those hand held fans with the collapsable blades be suitable for this type of conversion? How would I approach the conversion of this fan to be compatible with the computer? Could you suggest anything? Taking into consideration that I am not that electrically minded. – **R W Probert, Mid Glammorgan.**

● *Connecting a fan to a computer was covered in the Body Building article in August 89. However while that tells you how to do the job I am not sure that being told how to do something will count as you doing a project for your exam.*

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New horizons

December 6-9
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For the timetable offers something for everyone. The conference itself is divided into two distinct seminar programmes - one running on the Thursday and Friday, the other on Saturday and Sunday.

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Here then is YOUR chance to be not only entertained and informed but also to purchase computer Christmas presents at unbeatable prices. And it's all thanks to Acorn.

But don't leave it too late. Conference tickets are limited and will be allocated on a first come, first served basis.

Ensure your seat by completing and returning your application form TODAY.

Timetable of events

THURSDAY AND FRIDAY

11.00 - 11.50 am
CD ROM IN EDUCATION
Speaker - *A spokesman for Next Technology.*
VOUCHER WORTH £50 for a Next Technology CD Rom Drive

12 NOON - 12.50 pm
SCHEMA - A SPREADSHEET FOR THE FAMILY
Speaker - *David Clare.*
He has worked in the computer industry for more than nine years and is best known as the head of one of Acorn's longest standing third party software houses, Clares.
VOUCHER WORTH £30 for Schema

1.00 - 1.50 pm
IMAGE PROCESSING
Speaker - *Malcolm College.*
VOUCHER WORTH £40 for Wild Visions V9 Digitiser

2.00 - 2.50 pm
PC EMULATING AND OTHER OPERATING SYSTEMS
Speaker - *Ian Lynch.*
An expert on a variety of operating systems including IBM's PS2, MS dos, Unix and Risc OS, he is the curriculum development director for the City Technology Colleges Trust. In this role, he is responsible for supporting and developing curriculum innovation within colleges throughout the country
VOUCHER WORTH £30 for Acorn PC Emulator

3.00 - 3.50 pm
MUSIC-MIDI-MANIA
Speaker - *Mike Beecher.*
A graduate of the Royal College of Music, he is the managing director of ElectroMusic Research.
VOUCHER WORTH £30 for EMR Studio 24

4.00 - 4.50 pm
RISC TECHNOLOGY IN THE 1990's
Speaker - *Mike Muller*
A key memberof the Acorn Risc development team.
VOUCHER WORTH £25 for Programmers Ref. Manuals

5.00 - 5.50 pm
DESKTOP PUBLISHING
Speakers - *Martin Chappell and James Lynn.*
Martin Chappell is the Art Editor of Car Magazine, the largest publication of its type in the UK.
James Lynn is one of the chief designers and programmers on the Impression development team at Computer Concepts.
VOUCHER WORTH £30 for Impression 2

SATURDAY AND SUNDAY

11.00 - 11.50 am
HYPERMEDIA FOR ALL
Speaker - *David Tee.*
The author of two of the original programs on the first welcome tape for the BBC Micro, he is the man behind the Genesis project.
VOUCHER WORTH £20 for Genesis

12.00 noon - 12.50 pm
SCHEMA - A SPREADSHEET FOR THE FAMILY
(See details as for Thursday and Friday)

1.00 - 1.50 pm
PROGRAMMING MADE EASY WITH BASIC 5
(Including Dabs Compiler)
Speaker - *David Atherton.*
A co-founder of Dabs Press, he is well known as a regular contributor to leading computer titles.
VOUCHER WORTH £30 for a Dabs Press ABC Compiler

2.00 - 2.50 pm
PC EMULATING AND OTHER OPERATING SYSTEMS
(See details for Thursday and Friday)

3.00 - 3.50 pm
MUSIC-MIDI-MANIA
(See details for Thursday and Friday)

4.00 - 4.50 pm
FASTER COMPUTING - all the expansion options for the Archimedes
Speaker - *Alex Van Someren.*
The technical director of Aleph 1, producers of the first commercially available ARM 3 upgrade, he will demonstrate the full potential of the Archimedes and discuss future possible enhancements.
VOUCHER WORTH £50 for Arm 3 upgrade

5.00 - 5.50 pm
DESIGNING DOCUMENTS WITH THE HELP OF A COMPUTER
Speaker - *James Lynn.*
A leading light in desktop publishing technology, he is a chief designer and programmer at Computer Concepts.
VOUCHER WORTH £30 for Impression 2

Getting to the conference

Getting to Wembley Conference Centre is easy. All roads leading to the site are well signposted and the Centre is well served by buses and the tube (Jubilee & Metropolitan lines).

Conference registration

Complete the registration form below. Sessions are priced at £7.50 each on Thursday and Friday and £5 each on Saturday and Sunday. Or buy a "Rover ticket" and attend all sessions - £30 per ticket for Thursday or Friday - £15 per ticket for Saturday or Sunday.

Entrance to the Computer Shopper Show at the door is £5 for adults and £3.50 for under 16's, but for Acorn conference delegates only we are offering a reduced rate at £3 per adult and £2 per child. "Rover ticket" holders get in free!

Tick the boxes to indicate which sessions you will be attending:-
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Thursday/Friday 6 & 7 December

- ☐ CD Rom in Education
- ☐ Schema - A spreadsheet for the family
- ☐ Image processing
- ☐ PC emulating
- ☐ Music-Midi-Mania
- ☐ Risc technology in the 90s
- ☐ Desktop Publishing

Please register me for the following sessions @ £5 each.

Saturday/Sunday 8 & 9 December

- ☐ Hypermedia for all
- ☐ Schema - A spreadsheet for the family
- ☐ Programming made easy with Basic 5
- ☐ PC emulating
- ☐ Music-Midi-Mania
- ☐ Faster computing
- ☐ Designing documents with the help of a computer

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☐ Saturday ☐ Sunday
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.....Child tickets @ £3 } Conference delegates

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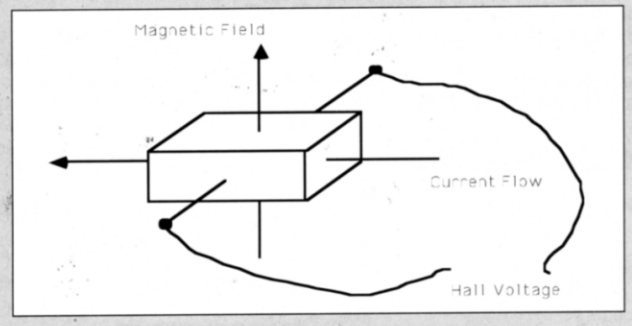

Figure I: The Hall effect

THE BEEB BODY BUILDING COURSE

The Hall effect

Mike Cook considers a type of switch that has a touch of the magician's wand about it

WE have looked at many different types of sensor in this series, but a technique that has not been covered in great detail is the use of magnetism. In the January 1988 issue of *The Micro User* I did look at reed switches and showed how they could detect the presence of a magnet and even how to use them to construct a computer–controlled game of nine pins.

To recap, a reed switch is a pair of spring contacts sealed in a glass envelope. When a magnet is brought near, the contacts move together to close an electrical circuit.

The great advantage of reed switches is that the contacts are sealed, so no spark is generated, an important consideration in a possibly dangerous environment. Also they can detect objects without having to make any physical contact.

There are two main problems with using reed switches in some applications. First they require a large magnetic field to activate them and second they are mechanical contacts.

This means that they suffer from contact bounce which can give false counts, especially in a computer monitoring system. In addition, the mechanical movement required to form a connection limits their switching speed.

There are, however, other techniques we can use to allow us the advantages of using magnets as remote sensors, and it is one of these we're going to look at this month. It is based on a phenomenon known as the Hall Effect.

Basically what happens is that you take a block of semiconductor material such as silicon or germanium and pass a current along its length. Now if you place this in a magnetic field you will find a voltage appearing across the sides of the block, as shown in Figure I.

For a given material the direction of this Hall voltage corresponds to the direction of the magnetic field and also the size of the voltage is directly proportional to the strength of the magnetic field.

The discovery of this effect was important in understanding electronic materials, as it went counter to the then established theories of electrical conduction.

You see, the current of electricity can be considered to be a flow of electrons, and these will be deflected by a magnetic field as they are in a TV tube. However in some materials a positive Hall voltage was observed, which meant that conduction was performed by the flow of positive charge carriers and not the negatively charged electrons.

In fact it turns out that this conduction is produced by a flow of holes, a hole being simply where an electron isn't, if you follow me! If an electron carries a negative charge then a hole will carry a positive one.

It might seem strange at first to think of the movement of a hole, but consider a glass of fizzy pop. You think of the bubbles travelling upwards, what is really happening is that the liquid is flowing round the bubble to make it appear in another place. It's just simpler to consider the bubble as an entity and plot its path.

In solid state physics holes are like that, it is really the electrons that are moving, but it is more convenient to consider the hole. How a hole comes to actually possess mass I will leave to the second year of a physics degree.

We can use this effect to make extremely sensitive proximity switches, which means that we can detect the presence of a magnet over a much greater range or use very much smaller or weaker magnets.

While the magnitude of the Hall voltage is very small it is possible to build devices

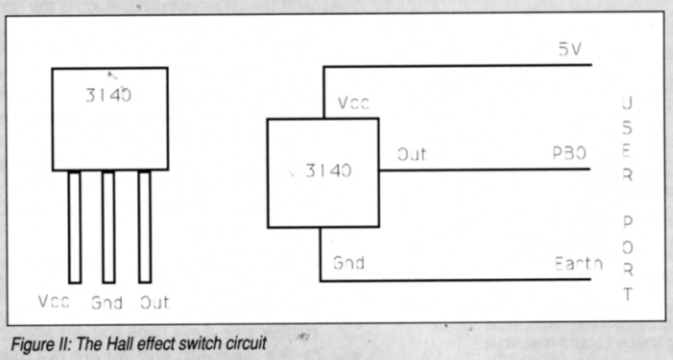

Figure II: The Hall effect switch circuit

which include an amplifier and threshold circuit, along with the Hall sensor, to produce a complete switch.

These are extremely easy to use and can be incorporated in a variety of applications. The simple circuit is shown in Figure II. You can feed the output of this device directly into the digital input of the micro's user port.

The switch shown will activate from a field strength of 260 Gauss, which is typically what you get from a small magnet a few millimetres away.

I have used Hall effect switches to detect the presence of a model train. A magnet was placed in one of the carriages and the Hall switch under the track. Another application that uses its rapid switching speed is a pickup for a tachometer. All you need do is attach a magnet to the rotating shaft you want to measure.

Another point is that the Hall switch is sensitive to which magnetic pole you use – it will only switch on the south pole. If it is presented with a north pole the Hall voltage is generated in the reverse direction and the switch never triggers.

You could use this to make a unique combination lock. Take several Hall switches and put each at the bottom of a tube. Then only when the rod magnets are placed in the correct combination will all the Hall switches be turned on – see Figure III.

You can have some fun with a linear output Hall effect sensor as well – when fed with a voltage it gives half that voltage out with no magnetic field.

A north pole will drive the output low and a south pole will drive it high, the output is about 1.3 mV per Gauss. However if we feed it from five volts the output range is unsuitable for direct connection to the analogue input port.

What we need to do is to reduce the voltage to about one volt without cutting down its range. The simplest way is to use two transistors connected as a Darlington pair working as an emitter follower. This is shown in Figure IV. It can then be fed directly to the analogue input port. There is a bit of noise from this port,so you are best using the command:

```
B%=ADVAL(1)DIV256
```

which will give a relatively stable reading between 0 and 255.

When I tried it I got a reading of 156 with no field. Then any fluctuation up or down will indicate the strength and polarity of a field. You could use this as the basis of a class project to construct a magnetic strength meter.

You could then plot how magnetic field varies with distance and confirm the inverse cube law. It's also a very convenient way of determining which is the north pole of an unmarked magnet.

One final trick is to use a small magnet to bias the Hall sensor, so that it will then respond to changes in magnetic material that do not necessarily have to be magnetised. This is achieved by fixing a small magnet to the back of the sensor and then the front is sensitive to iron, nickel or cobalt. The rest, as they say, I will leave to your imagination.

● *I have one or two ideas concerning magnets but as that's all we have space for this month I will have to leave them to another time. Let's hope you are attracted to this topic and that we are not poles apart....*

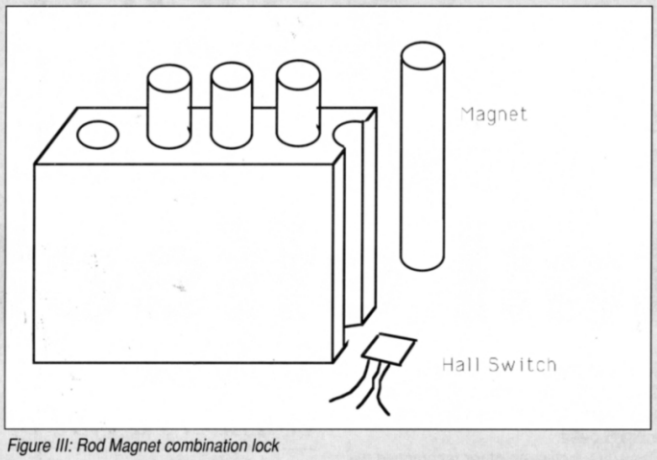

Figure III: Rod Magnet combination lock

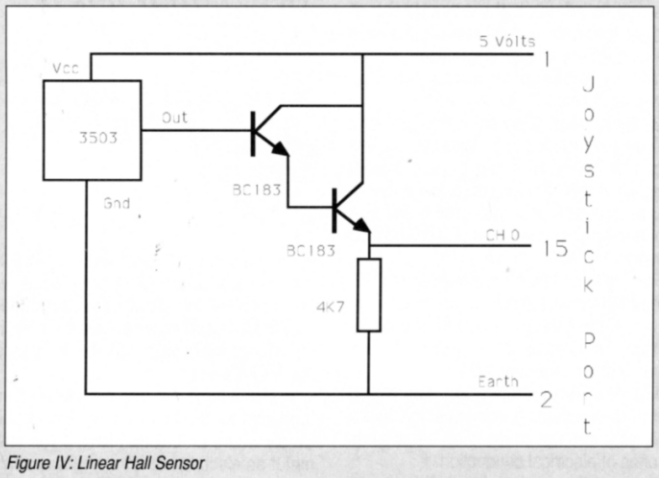

Figure IV: Linear Hall Sensor

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PINEAPPLE SOFTWARE

The Pineapple Software Real Time Colour Video Digitiser

What is a Real Time Video Digitiser? There are quite a few different 'Digitisers' available for the Archimedes but very few can accurately claim to fit the above description. The requirements are that it must be able to 'grab' a single field of video information from a colour moving source, such as a video recorder, TV, or video camera, and then process the image and display it on the computer screen.

The Pineapple Digitiser does just this, – and at a price which is less than some Digitisers which can only handle static images.

HARDWARE

The hardware consists of a double width podule which fits inside a 300 or 400 series Archimedes, and comprises a PAL colour decoder, 256K memory and various control and interface circuitry. The PAL decoder converts the input signal from your TV or video recorder into separate red, green and blue signals. These are then converted into digital form and stored in the 256K ram in a format giving 512 pixels across the picture and 256 rows vertically. The video signal in the ram is constantly changing at the same rate as the incoming video picture until the podule receives a signal from the computer to 'freeze'. At this point the last picture in the ram is frozen and can be transfered to the computer screen in many different ways depending on which software commands are issued.

SOFTWARE

The software to drive the podule is supplied on disc in the form of a relocatable module. This provides a host of additional '*' commands and SWI's which can be used even by inexperienced programmers to produce very impressive displays of live pictures or ones previously saved on disc. For non-programmers, ready written programs are provided to explore all the features of the Digitiser and produce 'Sprite' images which can be used in many other applications and 'Art' packages. The software is very easy to use and scaling routines are provided which allow you to manipulate the grabbed image by selecting any part of the picture (using a box drawn on screen controlled by the mouse) and placing it on any area of the screen, again using a box to select the position and size. This enables multi-picture images to be produced very rapidly using either live pictures or ones you have previously saved on disc. The 80 page handbook provides full details of how to implement the commands even for the inexperienced programmer.

EDUCATION

The Digitiser has many uses in education. The software commands can show many of the effects typical of the digital storage of TV pictures which can help to explain the way in which TV works. It can also be used to produce powerful audio-visual displays tailored to your own requirements from images captured using video cameras etc. For younger children, programs can be created to help learning by giving high quality visual images of animals, birds, trees etc, built into a 'quiz' format. The possibilities here are endless.

FUN & GAMES

As well as showing off to all your friends who don't have an Archimedes, what a great computer it is, you can use the Digitiser to produce images for all sorts of games and visual demonstrations. Games such as 'Guess the Celebrity' or 'Guess the Advert' can be produced by even inexperienced programmers, simply by 'grabbing' all the necessary images from TV and saving to disc.

SPECIFICATION

Video Inputs	Pal coded video, .75 Volts – 2·5 Volts pk to pk R, G, B & sync input All inputs may be terminated by internal DIP switches.
Resolution	512 x 256 pixels
Storage system	Standard version 4 bits Red, 4 bits Green, 4 bits Blue – 192KRam Extended version 5 bits Red, 6 bits Green, 5 bits Blue – 256K Ram
Picture Area	The Digitiser harware allows the full screen area normally viewed to be stored in the podule ram. Horizontal shift, Vertical shift and width can be adjusted internally if required.
PAL Decoder	The PAL decoder provides manual control of Brightness, Contrast and Saturation, combined with full auto saturation control.

QUESTIONS & ANSWERS

Q – What is the difference between the 12 bit and 16 bit version?

A – The 12 bit version can produce very high quality pictures, those shown on this page were produced that way, but 16 bits can give even better results particularly in high resolution screen modes.

Q – Why have an R, G, B input?

A – For those who have professional video cameras capable of producing R, G, B outputs, the R, G, B inputs can give significantly better results than the PAL inputs by avoiding the coding-decoding process. This removes some of the defects of the PAL system such as cross-colour, and also reduces noise.

Q – Is a moving picture available?

A – Yes, you can show a real live moving TV picture on the computer screen. This means that if you are using a video camera or recorder as an input source then you don't need a separate monitor to frame up the picture.

Q –Will it work on the A3000?

A – Yes, but you need an inexpensive adapter box which we can now supply.

Q –Are the controls difficult to set up?

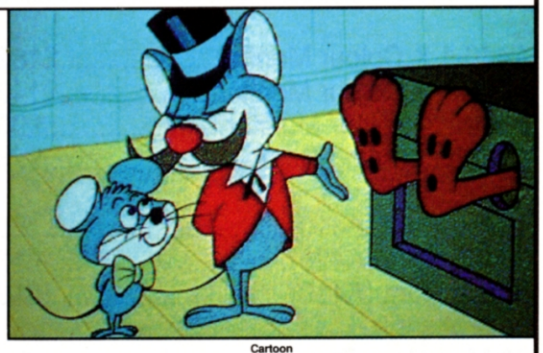
A –No, the three controls are exactly the same as on a normal TV set, Brightness, Contrast and Colour (Saturation). They may appear difficult to get at as they are at the back of the computer, but once set to your preference the brightness and colour should not require further adjustment, and the contrast (which is the easiest to get at) will only need adjusting if the video input source is changed.

Q –Does it take a long time to Digitise a full screen colour image?

A –Not really, a full screen image takes just 6 seconds on a standard 310, and reduced size images take proportionately shorter times.

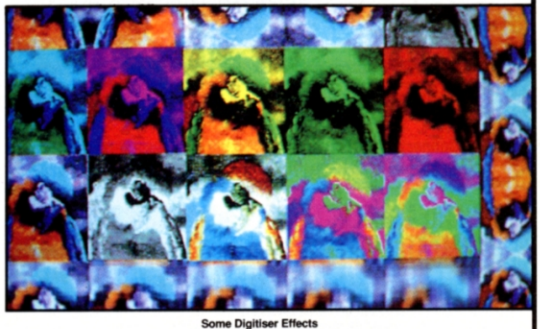
Q –What software commands are built into the module?

A –The software is under continual development and updates will be made available under our usual updating schemes (i.e) most updates are free), but the currently available commands are :– Average, Bits, Default, Digitise, Flip, Focus, Freeze, Image, Loadscreen, Loadsprite, Loadvideo, Mono, Moving, Negative, Noise, Outline, Palette, Primary, Restorescreen, SaveAIM, Savescreen, Savesprite, Savevideo, Screenarea, Setvideo, Unfreeze, Videoarea.



Cartoon

A Multi Picture Image



Some Digitiser Effects

– 'Pineapple has produced one of the 'ultimate' Computer Video Digitisers' –

–'The Pineapple Colour Digitiser looks to be one of the most professional products yet to be seen on the Archimedes'–

Acorn User – April 90

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ACORN USER Aug 88

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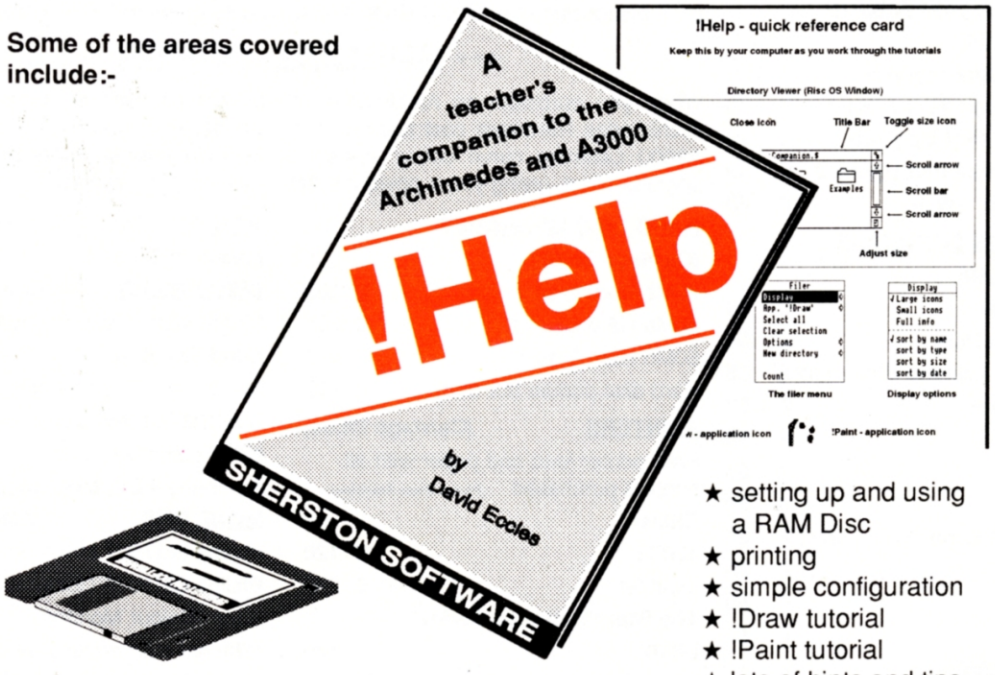

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A whiter shade of pale

Andy Nibbs extends the colours available on your BBC Micro

THE BBC Micro is limited to eight basic colours including black, plus the eight additional flashing colours in Mode 2. This second group is not much use as the colours alternated do not combine well, but it is possible to improve matters and produce other shades by a clever mixing technique.

There are various ways of defining the BBC Micro palette, but ultimately they all boil down to writing data to the palette register, which is 64 bits wide.

The address of the palette register is &FE21 and it takes 16 bytes of data poked into this area to fully define the palette of any mode.

In order to rapidly update the palette the machine code produced by the listing latches on to the moment before the screen display is updated, using the frame sync event – VSyniv – which occurs every fiftieth of a second.

On each VSync a set of colour data is written to the palette and a flag set – location &70 is used in the program. On the next VSync an alternate palette is used, so any or all of the colours can be changed. The flag is now flipped back so that the first palette is used again next time round.

Using this technique it's possible to produce more pastel shades, the softest ones being made with a mixture of white and another colour. A certain amount of flicker can't be avoided and certain combinations of colours are worse than others.

It is entirely possible to flash three or even more colour palettes, although the flicker would get steadily worse. It is something you might experiment with.

Keys for palette editor

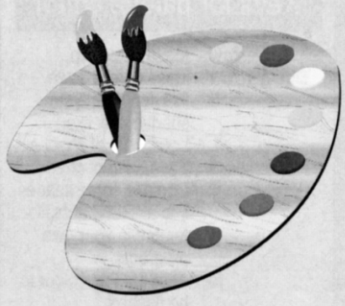
Up arrow	Move cursor up.
Down arrow	Move cursor down.
P	Preview what your shades look like.
L	Load a file of shades.
S	Save a file of shades.
C	Compile some shades into a *RUNnable file for use in your own programs.
f0	Alter the first colour to be flashed.
f1	Alter the second colour to be flashed.

Figure I: The palette register

Procedures

update	Updates full palette display.
normal	Erase magenta cursor band.
highlight	Prints magenta cursor band.
inc(T%)	Increments *T%*.
save	Saves palette data.
load	Loads palette data.
preview	Previews colours.
ass(code%)	Assembles special machine code.
compile	Saves data and machine code in *RUNnable file.
error	Error handler.
y_update	Updates information at cursor band.
oscli()	Performs call to command line.

```
   10 REM Extended palette
   20 REM By Andrew Nibbs
   30 REM (c) The Micro User
   40 :
   50 ON ERROR PROCerror
   60 Y%=0:*FX225 200
   70 DIM c(15,1),c$(15)
   80 FORB%=0TO15:FORC%=0TO1
   90 c(B%,C%)=B%EOR7:NEXT:NEXT
  100 FORB%=0TO15:READc$(B%)
  110 c$(B%)=c$(B%)+STRING$(10," ")
  120 c$(B%)=LEFT$(c$(B%),13):NEXT
  130 DATA white,cyan,magenta,blue
  140 DATA yellow,green,red,black
  150 DATA white/black,cyan/red
  160 DATA magenta/green,yellow/blue
  170 DATA blue/yellow,green/magenta
  180 DATA red/cyan,black/white
  190 REPEAT MODE7
  200 FORB%=0TO1:VDU141,132,157,130
  210 PRINTSPC6"Extended Palette editor"
:NEXT
  220 VDU23,1,0;0;0;0;
  230 PRINTSPC6"P)review S)ave data L)oa
d data"'SPC6"C)ompile code to file"'SPC6
"Cursor up/down to move up/down"'SPC6"f0
 alter first f1 alter second"
  240 PROCupdate:*FX4,1
  250 REPEAT
  260 PROChighlight
  270 A$=CHR$(GETAND&DF)
  280 PROCnormal
  290 IF A$=CHR$139 IF Y%>0 Y%=Y%-1
  300 IF A$=CHR$138 IF Y%<15 Y%=Y%+1
  310 IF A$=CHR$200 PROCy_update(Y%,0)
  320 IF A$=CHR$201 PROCy_update(Y%,1)
  330 UNTIL INSTR("PSLC",A$)
  340 IFA$="P":MODE2:PROCpreview
  350 IFA$="S":PROCsave
  360 IFA$="L":PROCload
  370 IFA$="C":PROCcompile
  380 UNTIL FALSE
  390 :
  400 DEFPROCupdate
  410 LOCAL B%,Y%:VDU31,0,6
  420 FORB%=0TO1:VDU141,132,157,130
  430 PRINT"Colour First"SPC9"Second"
  440 NEXT
  450 FOR B%=0 TO 15:Y%=B%+8
  460 PRINTTAB(6,Y%);B%;
  470 PRINTTAB(11,Y%)c$(c(B%,0));
  480 PRINTTAB(25,Y%)c$(c(B%,1));
```



```
  490 NEXT:ENDPROC
  500 :
  510 DEFPROCnormal:PRINTTAB(0,8+Y%)SPC5
:ENDPROC
  520 :
  530 DEFPROChighlight:VDU31,1,8+Y%,133,
157,130:ENDPROC
  540 :
  550 DEFPROCsave:CLS
  560 PRINT"SAVE DATA FILE -"
  570 INPUT"Filename: "A$
  580 IF A$="" ENDPROC
  590 X=OPENOUT(A$):FORB%=0TO15:PRINT#X,
c(B%,0),c(B%,1):NEXT:CLOSE#X:ENDPROC
  600 :
  610 DEFPROCload:CLS
  620 PRINT"LOAD DATA FILE -"
  630 INPUT"Filename:"A$
  640 IF A$="" ENDPROC
  650 X=OPENIN(A$):FORB%=0TO15:INPUT#X,c
(B%,0),c(B%,1):NEXT:CLOSE#X:ENDPROC
  660 :
  670 DEFPROCpreview:CLS
  680 PROCass(&900):CALL&900
  690 FOR B%=0 TO 15:COLOUR B%+128
  700 PRINTSPC20;:NEXT:A=GET:*FX13 4
  710 ENDPROC
  720 :
  730 DEFPROCass(code%):flag=&70
  740 FOR L%=0 TO 2 STEP 2
  750 P%=code%:[OPT L%
  760 .setup
  770  LDA #event MOD256:STA &220
  780  LDA #event DIV256:STA &221
  790  LDA #0:STA flag
  800  LDA #14:LDX #4:JMP &FFF4
  810 \
  820 \ Interrupt routine
  830 \
  840 .event
  850  PHP:PHA:TXA:PHA:TYA:PHA
  860  LDA flag:BEQ set2
  870 \
  880 \ Load colour set 1
  890 \
  900 .set1 LDX #0:JMP prog
  910 \
  920 \ Load colour set 2
  930 \
  940 .set2 LDX #16
  950 \
  960 \ Program palette
  970 \
  980 .prog STX flag:LDY #16
  990 .loop2 LDA cols,X:STA &FE21
 1000  INX:DEY:BNE loop2
 1010 \
 1020 \ Exit tidily
 1030 \
 1040 .end
 1050  PLA:TAY:PLA:TAX:PLA:PLP:RTS
 1060 .cols:]
 1070 dols=cols+16
 1080 FOR B%=0 TO 15
 1090 cols?B%=B%*16+c(B%,0)
 1100 dols?B%=B%*16+c(B%,1)
 1110 NEXT:NEXT:ENDPROC
 1120 :
 1130 DEFPROCcompile:CLS
 1140 PRINT"COMPILE TO A FILE -"
 1150 INPUT"Filename: "A$
 1160 IF A$="" ENDPROC
 1170 PROCass(&900)
 1180 PROCoscli("SAVE "+A$+" 900 "+STR$~
(P%+33)+" 900"):ENDPROC
 1190 :
 1200 DEFPROCerror:CLS:*FX13 4
 1210 REPORT:PRINT" at line ";ERL:END
 1220 :
 1230 DEFPROCy_update(Y%,V%)
 1240 c(Y%,V%)=(c(Y%,V%)+1)MOD16
 1250 PRINTTAB(0,8+Y%)SPC6;Y%;
 1260 PRINTTAB(11)c$(c(Y%,0))TAB(25)c$(c
(Y%,1))
 1270 PROChighlight:ENDPROC
 1280 :
 1290 DEFPROCoscli($&700):LOCALX%,Y%
 1300 Y%=7:CALL&FFF7:ENDPROC
```

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```
  10 =    0 0     270 = F195 4     530 = 50E2 A     790 = EE29 D    1050 = 3B90 7
  20 =    0 0     280 =  FF3 7     540 = 9719 A     800 = A66B A    1060 = 471D D
  30 =    0 0     290 = 5762 6     550 = 9234 6     810 =    0 A    1070 = 4D3D 4
  40 = 9719 9     300 = 650B D     560 = B5D3 4     820 =    0 A    1080 = BAA3 D
  50 = 9621 B     310 = 3EAC 5     570 = 8E43 4     830 =    0 A    1090 = 3106 E
  60 = 4286 B     320 = 1D7F F     580 = 2F8D C     840 = 8C61 8    1100 =  BB7 0
  70 = 1A83 7     330 = 598C B     590 = 86AF D     850 = A5E9 7    1110 = BB05 1
  80 = 13DE E     340 =  296 9     600 = 9719 E     860 = 1581 B    1120 = 9719 4
  90 =  AEE 9     350 = 5D72 8     610 = FFA1 B     870 =    0 B    1130 = 8CF9 6
 100 = 57F8 C     360 = E789 E     620 = C22E 3     880 =    0 B    1140 = 9E20 1
 110 = F229 7     370 = A8B8 4     630 =  9A0 C     890 =    0 B    1150 = 8E43 5
 120 = C3DE 2     380 = 226C 9     640 = 2F8D 0     900 = D90C A    1160 = 2F8D 8
 130 = 3C0F 1     390 = 9719 3     650 = 37E1 1     910 =    0 A    1170 = 853D 3
 140 = 5BB5 4     400 = F307 C     660 = 9719 E     920 =    0 A    1180 = 96B8 B
 150 = BFE7 9     410 = 44F4 E     670 = 59AB 7     930 =    0 A    1190 = 9719 8
 160 =  D93 0     420 = 2C8C B     680 = 9179 E     940 =  8AE 3    1200 = 35BC 1
 170 =  4A5 3     430 = B210 5     690 = C121 4     950 =    0 3    1210 = FA32 4
 180 = BE07 9     440 = 2C83 C     700 = 1B5D 0     960 =    0 3    1220 = 9719 E
 190 = 2F32 9     450 = F94F 3     710 = ED0F C     970 =    0 3    1230 = 1F2C A
 200 = 2C8C 8     460 = 765B B     720 = 9719 9     980 = 2839 1    1240 = E088 5
 210 = 2217 C     470 = BF5D 9     730 = F1B3 4     990 = DCEB 2    1250 = FCD2 4
 220 = 8EF3 6     480 = 8A13 1     740 = AAB9 B    1000 = BFBB 4    1260 = AFB9 8
 230 = 8D5D 3     490 = E531 3     750 =  61D 0    1010 =    0 4    1270 = 8724 8
 240 = 5481 F     500 = 9719 9     760 = 2E9B 5    1020 =    0 4    1280 = 9719 0
 250 = BFBA 9     510 = E7B5 6     770 = 52CC 4    1030 =    0 4    1290 = A6F3 2
 260 = 8269 A     520 = 9719 9     780 = C82B F    1040 = E188 5    1300 = 50E0 8
```

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IMPRESSION II

Impression release 2 is the first major upgrade to the leading DTP package for the Archimedes. It makes the preparation of documents, from the simplest letters to the most complex and intricate designs, easier than it has ever been before. It is the only program designed to be used as a word processor, to handle long documents while at the same time offering the most powerful page layout facilities.

Where word processing and DTP meet

As word processors grow more powerful year by year, Desk-Top-Publishing programs are becoming more like word processors, so that both types of product are evolving in the same direction. However few computers have either the power or a flexible enough operating system to allow the successful integration of the two approaches.

Impression on the Archimedes has successfully combined the best features of word processors and desk-top-publishing programs to create the logical result of that evolution. A word processor that can handle the most complex DTP, and a DTP program that can process words like no other - we call it a document processor.

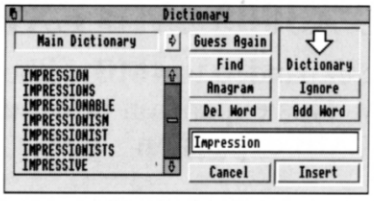
When other computers catch up with the Archimedes, all word processors will be like Impression. Why buy two programs when Impression can handle all your documentation requirements ?

Word processing

To be a successful word processor, a program has to be easy to use, include, amongst other things, real time spell checking, a powerful set of editing tools and the ability to handle documents from the simplest letter to complete books. What's more it has to be fast and responsive in use, something that lets down nearly all DTP programs.

Spelling checker

Spelling checkers have become a necessary tool in reducing errors in documents, not necessarily because they can catch spelling mistakes, but because they can also spot typing errors. The spelling checker supplied with Impression is based on the successful SpellMaster product, enhanced and fully integrated into Impression. It offers check-as-you-type, a 60,000 word main dictionary, up to 8 user extension dictionaries (which can automatically save themselves to disc) and two intelligent guess modes to help identify the correct word (one lists words that sound like the misspelt word, the other lists words based on the most common typing errors). It will even solve crossword and anagram puzzles.



The spelling checker dialogue

Long documents

Impression supports many features to aid the creation of long documents. By employing automatic disc slaving, it can handle documents of practically any size, even on 1Mbyte Archimedes. In fact, the memory available in the machine is no longer the limiting factor. Impression has already been used to produce books and manuals consisting of hundreds of pages, sometimes many megabytes long.

It also supports automatic index and contents compilation, again an enormous time saver. Impression 2 also has the ability to keep headings attached to the following paragraph, so eliminating 'widow' lines at the bottom of pages or columns. This improves the appearance of all documents, short or long.
As you might expect, automatic page and chapter numbering is supported along with the most flexible header and footer system around. These may be any number of lines at any position on the page, and even incorporate graphics. A new feature in Impression 2 allows headers and footers, or any frame, to repeat over a whole document or any specific range of pages.

Styles

Impression's unique style system can be a time saver for all types of word processing and DTP use. The appearance of headings, titles, quotes or any region of text can be made to appear in any combination of a vast range of stylistic effects. Each combination of effects can be given a name and applied to any required region of text with one key press. Styles save time because the combination of effects can be applied in one go rather than individually applying each effect, each time it is required. Styles are retro-active - any edit or alteration performed to a style will affect all occurrences of that style in the text. For example, if all quotes in a document are set to be italicised, and you want to change them to be bold, this involves just a single style edit.

The Impression style system is unique in two ways; firstly in the number of options available - text can be any size (even as large as the page), any line spacing, any font, any colour (background or foreground). Text may be set to have a strikethrough line or be single or double underlined. Tabs can be leadered (it automatically puts dots between tabs). Paragraphs can have an

automatic ruling line placed after them (of any thickness and colour) etc etc.

Secondly, Impression styles can be applied to any region of text, from a single character to an entire document. They can also overlap, so that one style can be used in a paragraph while another is used for a few words in that paragraph. The above quote example is not possible on other DTP systems since they cannot apply a style to anything less than a paragraph.

Master pages

Impression master pages are a powerful tool that provides control over the appearance of a whole document. Master pages control the size, layout and structure of all pages in a document. If you want all pages to be based on three columns on A4 paper with a graphic in the corner, then the master page can be set to create all pages in this fashion automatically. However, master pages are really powerful because, like styles, they are retro-active. Any change made to a master page will be reflected throughout a document. So, if you decide to have two columns rather than three, or perhaps arrange the page landscape rather than portrait, this can be achieved by one master page change.

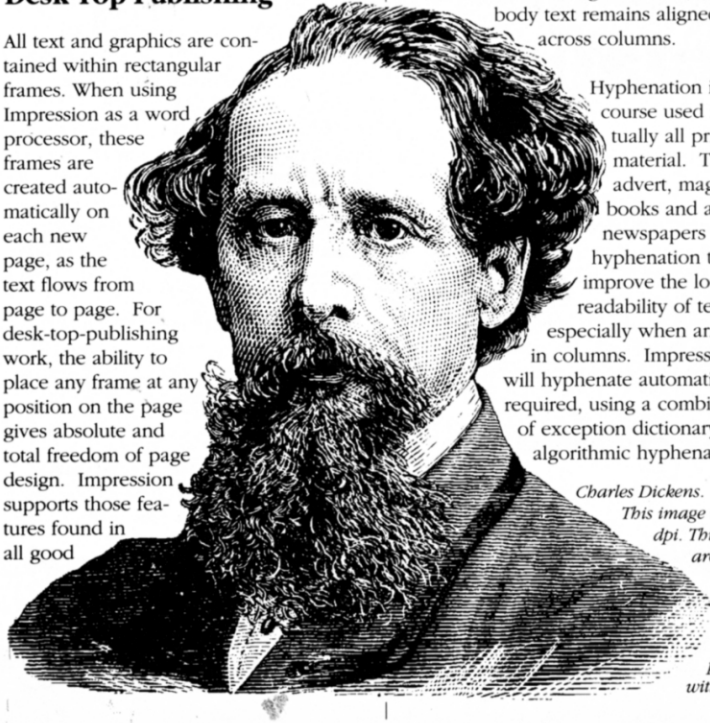
Impression supports any number of master pages (the pages can be any size) and can allow the page size to be changed *after* the document has been created.

Desk Top Publishing

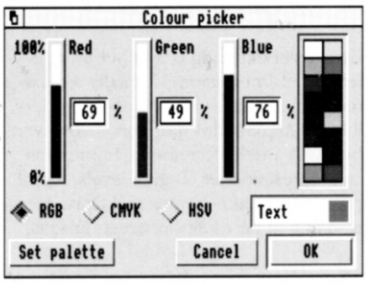
All text and graphics are contained within rectangular frames. When using Impression as a word processor, these frames are created automatically on each new page, as the text flows from page to page. For desk-top-publishing work, the ability to place any frame at any position on the page gives absolute and total freedom of page design. Impression supports those features found in all good DTP programs such as the use of any font, any size. Frames of any size may be placed at any position on the page, and may be set to be transparent or opaque (any colour). By using the Acorn anti-aliased font system, it presents the ultimate in WYSIWYG displays. And since the scale of the page can be altered from 1% to 900% of actual size, it is possible to examine the page in enormous detail so that text of 1pt can be edited, or at smaller scales, complete page spreads can be viewed. Impression even allows more than one window, at different scales, on any document.

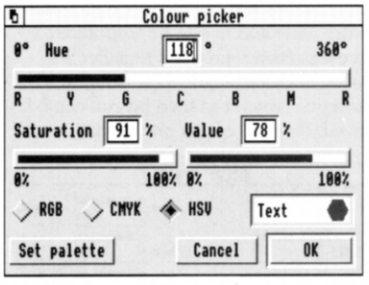
Impression also includes two essentials needed for any high quality, professional publishing, hyphenation and text gridlock. The latter ensures that lines of text align across columns. Examine most quality newspapers or magazines and you will see that, even when pictures or different size headings are used, the main body text remains aligned across columns.

Hyphenation is of course used in virtually all printed material. This advert, magazines, books and all newspapers use hyphenation to improve the look and readability of text, especially when arranged in columns. Impression will hyphenate automatically if required, using a combination of exception dictionary and algorithmic hyphenation.



Charles Dickens. This image was scanned using the Scan-Light Junior scanner at 400 dpi. This sprite was re-touched using !Paint and a mask drawn around the head. Although Impression cannot automatically flow around irregular shapes, by placing a collection of transparent, but repelling, frames around the drawing, the text can be made to repel around any desired shape. By using the group frame facility, the repelling frames can be permanently tied to the drawing, so that the whole image with its repelling frames can be moved and scaled as one.





The RGB colour selector (left) has a pre-selection of 16 colours, but allows any colour to be defined. Three alternative colour models are available, such as HSV shown on the right, which allows new colours to be selected in a more intuitive manner. These colour selectors can be used to set the colour of just about anything in Impression - text background and foreground, line and frame colours etc.

Users can add their own hyphenation points either manually in the text (using soft hyphens) or to words in the hyphenation exception dictionary.

Frames

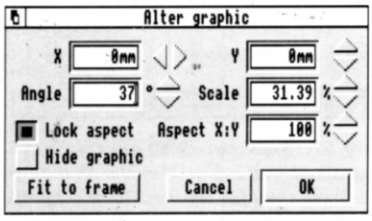
Since frames are a key part of Impression, a great deal of time has been spent ensuring that all possible frame manipulation tools are provided in a fashion that is convenient and simple to understand. Text frames can be connected to other text frames so that text will flow from frame to frame, in any desired order. (This can be displayed graphically, along with the number of words not fitting within a frame.) Any frame can be re-sized at will, and each frame can have independent repel margins. (Text can be made to repel around another frame, and the repel distance from any side of the frame can be controlled.) Text contained within a frame can also be inset from the frame edge by any amount.

Multiple frame operations

Any set of frames on a page can be temporarily selected together (multiple frame selection). In this mode the frames can be moved together as a group, and they can be copied to other pages or other documents. If one is re-sized, all others will change size by the same amount. (Imagine you want to make three columns slightly narrower - by selecting all three columns and changing the width of one, they will all change by the same amount.)

In addition frames can be permanently grouped, so captions can be permanently

attached to graphics. This also allows multi-column text frames. Since grouped frames scale and re-size in proportion, three text frames grouped together act exactly like one single, three-column, text frame which can then be cut, copied, moved, dragged etc. as one object.

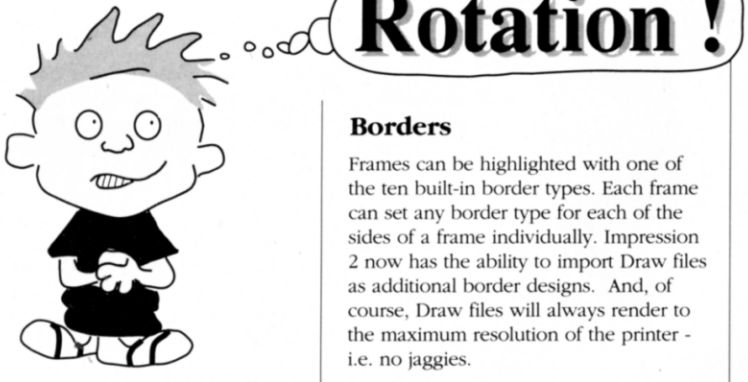


The Alter graphic dialogue allows precise numeric values to be entered.

Graphics

Either line art graphics (for example from !Draw) or bit-image graphics such as sprites, scanned or digitised images, can be placed in a frame. The graphics can be scaled, stretched, cropped as required, all instantaneously. Graphics can also be rotated by any angle, also instantaneously. And it can do all this without going near a dialogue box or menu option. Of course you can enter exact numeric scale or rotate values if required.

All graphics scale and rotate options are performed in real time - there is no delay or calculation required, and neither is the original graphic altered. So graphics can be scaled and rotated as much as you like without suffering cumulative distortion effects. Neither could it be simpler - by using the adjust mouse button, any graphic can be dragged around the



centre of the frame, interactively. Speed tests indicate that rotation of sprite graphics is over 500 times faster than !Paint.

Although Impression cannot directly rotate text, it is supplied with a utility program that will convert lines of text into an outline graphic file. This can be dropped onto a frame where it can be freely rotated; ideal for headlines or any text that needs to stand out.

Grey level dithering is another unique feature of Impression. Normally a maximum of 16 shades of grey are reproducible on Archimedes monitors. However, by using a dithering ability, Impression can represent over 60 grey levels, for all types of graphic - sprites and Draw files, resulting in far more on screen images.

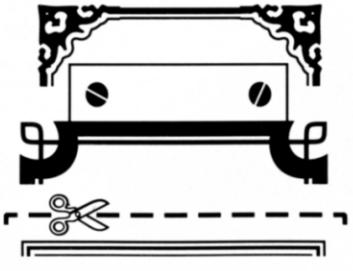
Flowing graphics in text

$$x_i = \sum_{k=1}^{n} t + m + \frac{A - Bc}{c + d} - y$$

Any document more than a few pages long, that contains graphics, usually requires the graphics to be tied to a particular part of the text. Impression can embed any graphic into the text, even as part of a line if required. For example, the above equation (from our Equasor program) embedded into the text will stay with this text wherever it is moved.

Borders

Frames can be highlighted with one of the ten built-in border types. Each frame can set any border type for each of the sides of a frame individually. Impression 2 now has the ability to import Draw files as additional border designs. And, of course, Draw files will always render to the maximum resolution of the printer - i.e. no jaggies.



Some examples of some of the frame borders possible from Impression. You can also design your own with !Draw.

Printing

Impression has always had a very wide range of printing options. Impression 2 takes this even further by supporting two completely different modes of operation - draft printing and RISC OS printing.

Word processors typically use the built in character set of the printer - this is fast and ideal for text only documents. DTP programs, on the other hand, use the RISC OS printer drivers that can deliver an exact representation of the page, including all fonts and graphics, to the maximum resolution of the printer. Unfortunately RISC OS printing can typically take 5 or more minutes per page on most dot-matrix printers. (PostScript or direct drive laser printers are the exception to this rule.)

Impression 2 supports both modes. Draft mode allows any document to be printed using the built-in character set of the printer, matching the closest fonts available in the printer to those used on screen. This can be used for obtaining a quick text draft of any document - even complex DTP layouts. If Impression is being used as a text only word processor, this mode is fast and accurate while still allowing full control over printer attributes such as bold, italic, underlining etc. This mode even allows multi-column text, multi-line headers and footers etc and so means that Impression is now a truly effective alternative to traditional character mode word processors such as First Word Plus.

RISC OS printing in Impression allows the page to be scaled by any amount or rotated by 90 degrees. Unique features are its pamphlet mode and multiple pages per sheet options. This allows any number of scaled down pages to be printed on a single sheet - useful for thumbnail printing and vital for proofing since it means that A4 documents can be printed 2 up, as A5 pages on a single sheet of paper. The pamphlet mode takes this further by printing the pages correctly rotated and arranged for folding into a pamphlet.

Impression 2 also allows any number of copies of a page to be fitted on each sheet and reflected printing (professional typeset pages can be printed emulsion side down.)

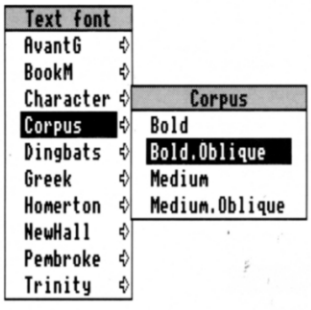
Needless to say, this document was created, arranged, edited and typeset entirely with Impression 2 on a 2Mbyte Archimedes. Line-art originated from

Word substitution

Another unique Impression feature is word substitution or abbreviation expansion - as you type. Any commonly used word or phrase can be assigned any abbreviation and added to a dictionary. When the abbreviation is subsequently entered, it is automatically changed to the fully expanded word or phrase.

Ease of use

Much of the design effort for Impression has gone into the user interface. The program has the minimum of menu options (only 6 main menu items), so new users are not overwhelmed by dozens of menus. Full use is made of dialogue boxes which can remain on screen while editing continues. For example the 'Alter graphic' dialogue, illustrated opposite, will remain on screen and dynamically indicate any alterations performed to the graphic with the mouse. The result is that, although Impression is more powerful than any alternative, it is actually simpler to learn and easier to use.



Fonts are listed by family so reducing the size of menu and making it easier to select any required weight.

RISC OS

Impression is totally RISC OS compatible and follows the Acorn RISC OS guidelines. It integrates with other programs and supports in-memory transfer with co-operating applications. For example importing a picture from !Paint, !Draw or ScanLight involves simply dropping the appropriate icon onto a blank frame in an Impression window.

Impression can access the full RISC OS character set that includes a complete set of European characters. European versions (with translated manuals, menus etc) are available.

!Draw. The scanned image was obtained using Scan-Light Junior. Proofs were produced on a LaserDirect printer (90 seconds for all 4 pages).

The IMPRESSION family

Impression 2 is part of a family of products that includes Impression Junior, a low cost, less capable, yet fully compatible version of Impression. The family therefore covers the broadest possible spread of requirements. All versions can be upgraded to more powerful versions - Junior to Impression 2 for the difference in price, Impression release 1 owners can obtain a free upgrade to release 2. All Impression owners get a regular newsletter, upgrades to future versions and the support of the largest, and oldest, software house in the Acorn market.

Unique Impression points

We could list dozens of features but the following is a list of some of the more important features that we believe set Impression apart from any other word processor or DTP program.

The Impression style system
Graphics rotate
Graphics grey-level dither
Group and multiple frame operations
The spelling checker
Built-in hyphenation
Documents larger than memory
Supremely fast and responsive
Index and contents compilation
Draft and RISC OS quality printing
18 quality outline fonts included
Retro-active master pages
Word substitution as you type
Graphics flowing within the text
The range of printing options
The ease of use
The shortest learning curve
Impression Junior
The history and experience of the Impression developers and the sheer number of man-years of effort put into this product.

Computer Concepts Ltd

Gaddesden Place, Hemel Hempstead, Herts. HP2 6EX
Tel 0442 63933 Fax 0442 231632

Educational discounts

A range of educational discounts, site licences and network licences are available for both Impression release 2 and Impression Junior. Contact Computer Concepts for details.

The package

The package includes: A 300 page manual with reference, introduction, tutorial section and index; the acclaimed 'DTP at a glance' introduction to desk top publishing; five discs including Impression and installation program, a selection of extra utilities (such as the previously mentioned text to Draw converter and a utility that provides over a dozen new screen modes for both normal and multi-sync monitors), a selection of clip-art and example graphics, printer drivers (licensed from Acorn) for a wide range of dot matrix, laser and ink jet printers. 18 quality outline fonts. (12 licenced from Acorn). It also includes 8 non outline, character mode fonts.

Impression is compatible with all (the every growing number of) RISC OS outline fonts and can access all weights of all fonts. The following shows some of the (over 200) symbols from the Dingbats font included as part of the set.

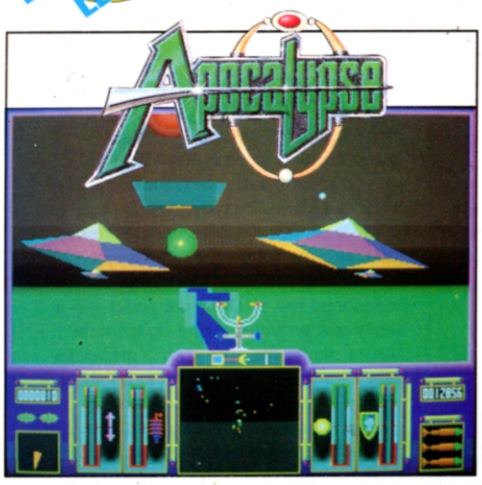
Money back guarantee

Your guarantee of satisfaction is that when purchased direct from Computer Concepts, Impression 2 is offered with a full 'no quibble' money back guarantee.

£169.00 +VAT (£194.25)

A3000 ARCHIMEDES BBC B/MASTER ELECTRON

THE 4TH



APOCALYPSE

Apocalypse is designed purely for the Archimedes. Utilising the machine's colossal processing power combined with ingenious programming techniques, the author has created a masterpiece which could not have been produced on any other home computer. The author is of course Gordon Key who already has Holed Out and E-Type under his belt. Apocalypse is by far his best work to date.

The game places you on the surfaces of varied futuristic hostile planets colonised by ruthless enemies. With your highly advanced craft you must find your way around the planets and systematically annihilate the enemy. Your ship, which can fly.or move along the ground, is extremely fast and can even fight whilst hurtling backwards.

The graphics are truly unbelievable. The solid, shaded 3 dimensional buildings and objects are animated more quickly and smoothly than ever before. If you shoot at them they explode in a way that is terrifyingly real often catching fire before bursting into a ball of flames accompanied by devastating sound effects.

Initially Apocalypse is easy enough for a beginner to enjoy but as you progress your foes will become increasingly hostile and you will discover fascinating new objects. These can have strange properties and many may need to be destroyed. It will be up to you to discover how.

The Royal Guild of Spacing will monitor your progress as you play. Your performance will be assessed at appropriate times and you will need to impress them if you are to continue your adventure. Apocalypse is an amazing game. There's only one way to describe it....

RAW EXCITEMENT.

PRICE: A3000/Archimedes £29.95

A3000/ARCHIMEDES

A3000/ARCHIMEDES

A3000/ARCHIMEDES

A3000/ARCHIMEDES

INERTIA

Inertia is a totally original game with a huge landscape just waiting to be explored. It is available for the Archimedes, BBC Micro and Acorn Electron. Scattered (or rather fiendishly placed) around the landscape are many special tiles which need to be collected. Your highly sensitive craft floats freely around the landscape and you must exert forces upon it to guide its speed and direction.

You have a 3 dimensional viewpoint displaying a tiny fraction of the total playing area. There are walls, bridges, tunnels and ramps to negotiate and a host of mystery tiles with strange properties indeed. These include ice, jump and transformation tiles. There are even certain tiles which alternate the controls so that everything works in reverse.

This massive game has been very carefully put together and solving the puzzles within it will need lateral thought and a lot of dexterity.

The Archimedes version is considerably enhanced with digitised sound and music. It even features a full colour 3 dimensional map of the game which is a joy just to wander around. You'll certainly be amazed at the size of the game and the variety within it.

Inertia is a game for the determined. Each version makes full use of the ability of the computer so make sure you've got plenty of time to spare. Once you have started you won't be able to stop.

Electron User Golden Game May'90

BBC Micro and Acorn Electron versions available ***NOW.***
Enhanced Archimedes version available in June, 1990.

PRICE:

A3000/ Archimedes	**£19.95**
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Compact 3 1/2" disc	**£13.95**
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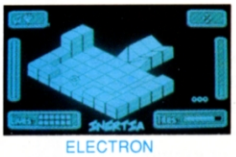

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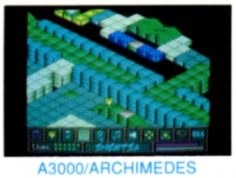

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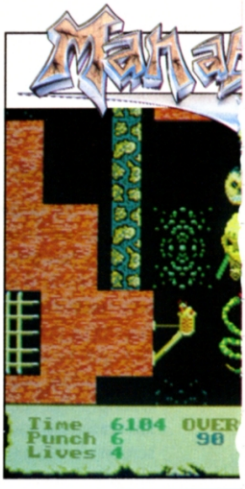

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In the age when the castle was supreme it took dedicated warriors to overcome their defences, to loot and pillage, and finally to destroy.

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As you progress you will discover many intriguing objects which can behave very strangely. Many are documented such as wooden panels, hour glasses, thorns, portculli, mirrors etc.. But most are

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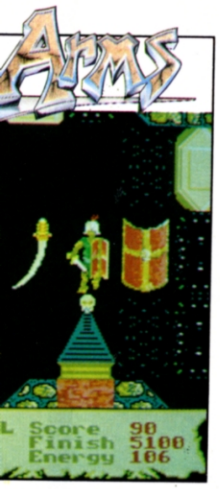

ARMS

hot. When you think your stuck, experiment and you'll discover properties you never knew existed.

The subtle blend of arcade iming and adventurous puzzles nake Man-At-Arms fiendishly ddictive. You must plunder each f the 4 castles which become ncreasingly "puzzling" as you rogress. Your overall objective is o kill all foes with your mighty word and to plunder as much of he most valuable treasure as you an carry.

Man-At-Arms is a fascinating hallenge with superb sound effects nd music. No attention to detail as been spared and you can be ure of many late nights for weeks come.

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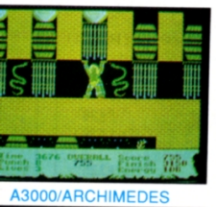

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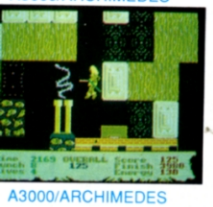

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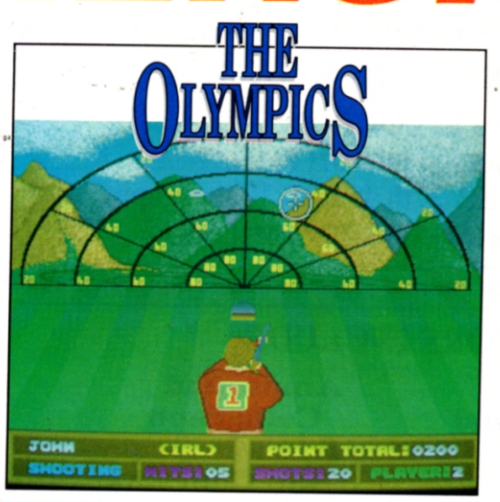

THE OLYMPICS

The Olympics is an experience which can be played by 1 to 8 players. It contains a superb piece of music, opening and closing ceremonies and 14 national anthems. When a player wins a gold medal the national anthem for his chosen country is played. Any World Records that you achieve can be saved to disc. With the click of a button all the relevant information concerning the record is automatically saved including your name, the exact time, day and date!

It is comprised of 6 main events: Diving, Shooting, Javelin, Swimming, Canoeing and Pole Vault. Some of these have several "sub-events" to choose from - there are 2 Shooting events, 12 Swimming events and 3 Canoeing events. These events have been chosen for maximum variety and enjoyment. They will "extract" all sorts of abilities: manual dexterity, timing, memory, perserverance, adaptability and above all guts!

The menu systems are controlled entirely with the mouse. As such they are extremely easy and quick to use. All events can be practiced or competed in individually, or altogether for maximum Gold, Silver and Bronze medals. You can also play all 6 events as a sort of "hex-athlon" where points are awarded for each event - the player with the greatest number of points is deemed to be the winner.

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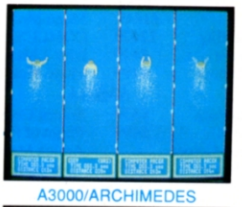

A3000/ARCHIMEDES

A3000/ARCHIMEDES

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NEVRYON

This fast arcade game is disc based only and boasts 100K of graphics and game code for the BBC and 2 discs of over 1.5 megabytes for the Archimedes. It is a fast sideways scrolling shoot'em up which features 8 levels of furious opponents and very varied and very detailed graphics.

You fly a spaceship which can attain immense firepower - more lasers, a ram, gun droids and highly destructive missiles which are released from the top & bottom of your ship, then ignite and shoot forwards.

Whilst the BBC version is superb, the Archimedes version has been considerably enhanced and is truly exceptional putting many arcade games to shame. Nevryon uses the machine's raw power to full effect and gameplay is second to none.

It comes on 2 discs and features 5 true levels of parallax scrolling, more than 50 objects on screen, over 1 megabyte of 256 colour graphics, digitised stereo sound and music etc. etc.. You control a different ship on each of the 4 scenarios and there are a seemingly infinite number of weapons to collect and use. End of level monsters are beautifully animated but are anything but friendly.

BBC Review: "Graphics are very colourful and hectic, with explosions, missiles and aliens all heading for your ship. Together with a scrolling landscape, complete with stars moving in the background, they combine to form an enjoyable and action packed game." Micronet, Feb'90.

*BBC Micro version available **NOW**.*
Enhanced Archimedes version available in June, 1990.

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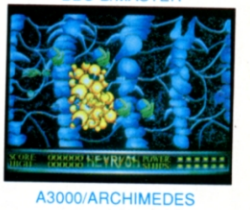

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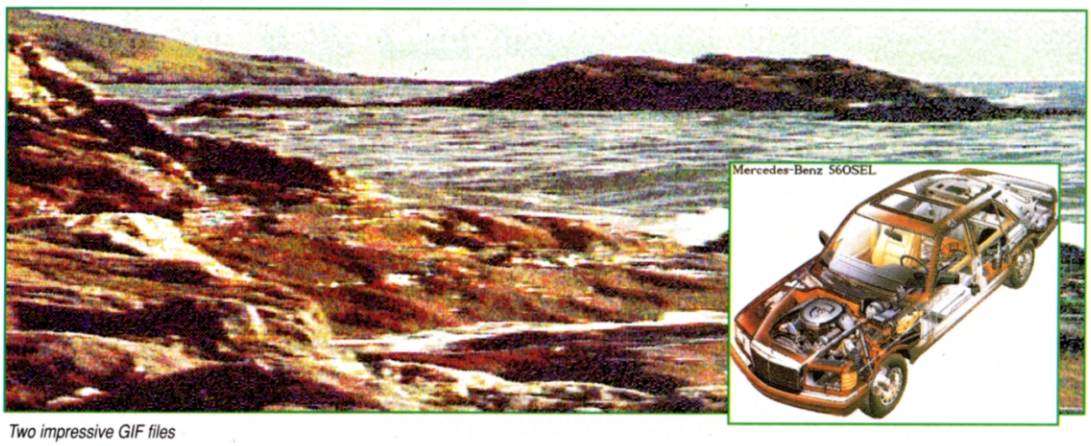


Two impressive GIF files

Wonderful land

Teri Paul dons her deerstalker to root out the best from the world of PD

There are a whole host of pictures, diagrams and so on available in the public domain. Some can be accessed from bulletin boards – usually in GIF format – others can be begged from friendly ST, PC or Amiga owners.

But once you have got these wonderful creations, how can you read them on your Archimedes? Easy thanks to !Translator which is available from most, if not all, public domain libraries and Diamond Public Domain has sent me the latest version. They have a large range of GIF files available too.

A couple of nice utilities alongside !Translator are !MakeGIF and !MakeTIFF. These enable you to put your drawings into a format readable by other computers, and do your bit for increasing the stock in the public domain pond.

I've included !Translator on the subscription disc (again) with two rather nice GIF files of a Mercedes Benz and a landscape. So you can see the standard of artwork available to you.

Profits from Diamond PD's disc go to the ATC centre at Ellesmere Port, catering for the mentally handicapped and people with Downs Syndrome. Whereas new PD house Arcaynia, PO Box 1927, Sutton Coldfield B74 3QZ prefer to charge only £1 a disc.

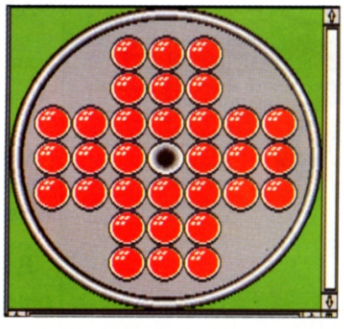
Games galore

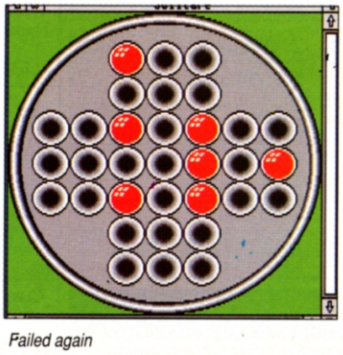
Martin Dunn from the Netherlands wrote to me with Space Game. Very simply you must manoeuvre up the screen avoiding the cones as you go. Simple, but you only get one life. Being an addict of Patience on the Applications disc, I couldn't resist playing Solitaire. In fact I think I'll just go back and do a bit more testing ...

I loaded up a disc from Paul Vigay – being the intellectual sort he reads Scientific American and was inspired by one of their articles to create Microgolf.

This is more along the lines of Crazy Golf and is really rather good. The idea is to putt your ball into the hole in as few shots as possible. You can make life more difficult by adding rough, bunkers, changing the position of the tee or shape of the course.

If you are especially masochistic you can also add other options: A twilight zone which causes your ball to appear at random on the green, a black hole – when entered the ball reappears from a white hole or a rogue ball which moves happily in a circle deflecting your ball away. The game and instructions are very professionally put together and a pleasure to use.



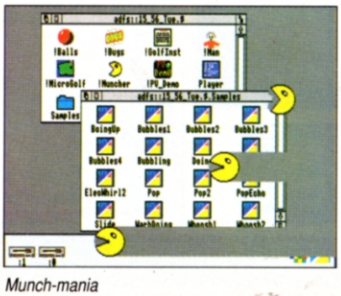


Pailed again

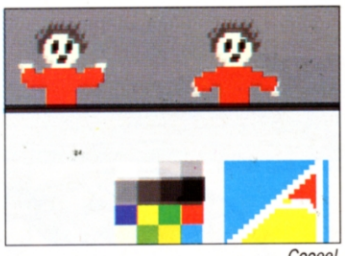
Comic stuff

This month's crop also contains a couple of gimmicks which could have a severe effect ➤

An easy !Microgolf course



Munch-mania

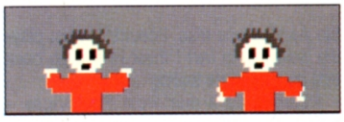


Cooee!

on your heart rate:

!Muncher is a Pacman clone – bright yellow with a very large mouth. Click him and nothing appears to happen. However, some time later he will appear and start to consume your DeskTop. Don't worry though, he's quite a benign creature at heart and pressing f12 then Return will restore your screen.

Do you get lonely in those wee small hours? If you long for a friendly greeting then !Man is for you. Activate him in the usual manner, and just when you think everyone has abandoned you he will pop up from behind the icon bar shouting Cooee!



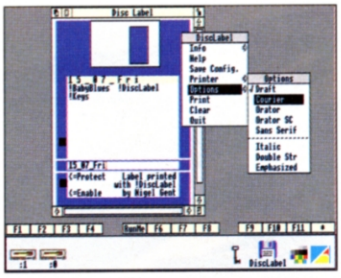
Useful Stuff

A scientific calculator popped up on my DeskTop this month as did a utility called Keys.

Keys puts a function key handler above the icon bar. This allows you to define and activate them from within Risc OS. Simple to use and run, it could be a boon for programs such as Impression.

An amazingly simple but incredibly useful utility appeared at the same time – DiscLabeller. Sitting on the icon bar you drop files from a filer window into the DiscLabeller icon, or window if you prefer. Your filenames will then appear on the label on screen.

You can edit the names, rearrange the layout and, of course, print. A very neat little program.



Disc labeller and !Keys

The monthly disc

You can acquire the Archimedes programs mentioned this month on the November subscription disc.

To get as much as possible on the disc we have archived the programs, cramming 1.6Mb into 800k. Double clicking on one of the archive files and then dragging the relevant files from the archive window must be done before you try to run them. Also !Sparkplug needs to have access to your !System directory so make sure that the Filer has seen that first.

BBC PD

Alan Blundell from 18 Carlton Close, Blackrod, Bolton BL6 5DL, has opened a BBC PD library. He already has on offer a Small C Compiler, a programmers help rom, a spelling checker for View and he plans a section for the Master 512 Dos coprocessor soon too.

Other BBC PD programs are starting to trickle in too, so hopefully I'll being you a review of the best next month.

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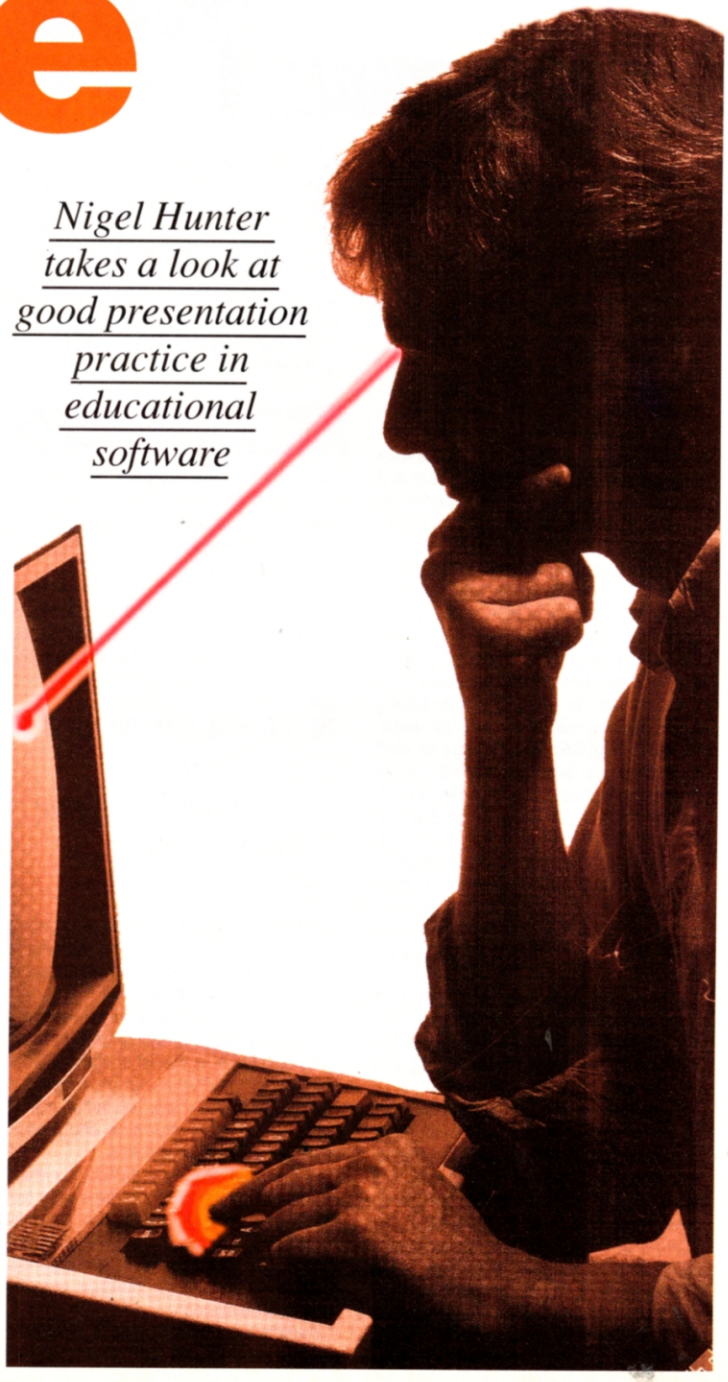
Easy to use

Nigel Hunter takes a look at good presentation practice in educational software



AFTER nearly a decade of use, the BBC Micro range still remains the backbone of British educational computing, presenting a large software marketplace, as the recent success of packages such as Fun School 2 proves – more than 150,000 units in all formats sold.

It is important to remember that good quality software is essential if teachers and pupils are to get the most from their hardware investments. When an educational program is being produced, sound educational ideas must be combined with a good user interface.

Although some good teachers are good programmers, most software is produced by good teacher/good programmer teams. By knowing the capabilities of the equipment and having an insight into good presentation principles, the programmer can support the teacher in ways beyond the pure programming role.

The choice of screen mode is a good example of the necessary teamwork. So let's look at some of the basic principles involved – some people will say that they are obvious, but you don't have to look far to see programs that ignore most or all of these issues.

Presentation

Screens should be designed to be stimulating and functional without being complicated. If the user is confused the program cannot be expected to be fully effective: Don't fill the screen with irrelevant text and graphics, but *do* consider the need for useful and instructional messages. Clarity is all-important, and a number of things can be done to get the best from the hardware.

The choice of screen mode is an important initial step when designing virtually any program. The programmer must consider ram usage, number of colours available and resolution of text and graphics.

If your program does not need high resolution graphics, why not use memory-effi- ➤

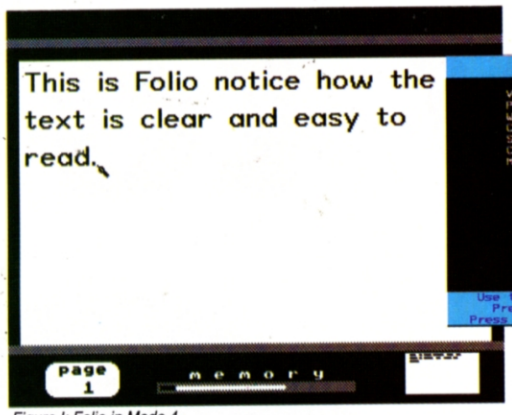


Figure I: Folio in Mode 4

Figure II: Contact Compiler in Mode 7

cient Mode 7? You will then have access to what must surely be some of the clearest text around.

If high resolution graphics are required though you may still be able to use Mode 7 for intermediate menus. Modes 5 and 2 provide chunky text that is difficult to read but if lots of pure colours are essential, Mode 2 is the only real option.

Obviously, these 20 column modes also limit the numbers of words per line, which may be a problem. If you do need to work in Mode 2 you can redefine the character set to consist of slightly smaller letters and numbers, then write a simple procedure to print the characters closer together across the screen.

While not actually improving the readability of individual characters, this technique does help to overcome the words per line constraint. Extra text styles can be made available in all graphics modes by using vector graphics to draw the characters.

This method can also incorporate scaling factors to allow text of almost any height and width. The Folio (ESM) range of word processors use large custom lettering to provide excellent results – see Figure I.

If the software is likely to be used by more than one pupil at a time – and the screen display is simple – think about using large characters. Mode 7 provides an easy way of printing double-height text, but you could also consider double-width, quad-height and so on, if you are using a graphics mode.

When colour computers were first used in the classroom it was tempting to use every available colour. In some cases the resultant programs were confusing and overpowering.

Since the release of machines such as the Archimedes restraint has been even more important. However, forgetting sprite-type screen components – which may well benefit from all the available colours being used – there are only a few basic rules.

Avoid using low-contrast foreground/background colour combinations: White and cyan just do not mix. Additionally, if you have similar categories of on-screen text, try to use the same colour for each item. If you were displaying database fieldnames, you could use one colour for these alone.

All error messages and warnings could be displayed in red on black. All instructions in white on blue, and so on. With Modes 7 and 2 in mind, remember that too many colours can spoil the broth. Bear in mind that learning to use the program must be painless and quick. By employing consistent display presentation you will be aiming in the right direction.

Responses

Assuming that the program can make a good job of getting information on to the screen for the students, let's consider the means of passing information in the opposite direction.

Two ways are often used to provide menu options, and we will look at these first. It does not matter which technique you choose, but do ensure that you use the same one throughout. After all, why should the user have to spend ages learning to use the software when it is only a means of learning about something else?

> *'... tricks can be used to make an educational program more effective'*

Take a look at Figure II. You make a selection by using the arrow keys to move a highlight bar over the list of options. Once entirely happy, Return can be pressed to confirm the choice. Also, notice the instructions, which leave you in no doubt as to which keys should be pressed.

The screen display is particularly effective thanks to the clear double-height text presented in contrasting colours. A similar technique is used by both The Music System (System Applied Technology) and the new common user interface applications from Resource.

Another popular technique is to place a number next to each option and expect users to press the appropriate numeric key – but don't be tempted to leave it at that. When a selection has been made, change its colour or make it flash to show which one was chosen. Expect Return to be pressed for confirmation.

This technique is suitable for menus with less than 10 options, unless you display the selection number as it is entered.

Some entries cannot be made through menus – take entering a name for example. You will need to trap a number of potential problems and the INPUT command does not allow such real-time checking to take place. A good universal input function should be written using GET or similar.

This will allow the software to limit the length of the input string and filter out illegal characters – numbers and control codes in this case. The function would use a number of flags and other parameters to control the input function.

One flag could be used to indicate that, as they are entered, all letters should be turned into, say, lower case. Another flag could indicate whether a Return press would be valid without anything having been entered.

A similar numeric input routine could be used to accept only numbers and ensure that numeric ranges were not broken. Also a flag could specify the number of decimal points – none or one – allowed. In any input routine, allow Delete to operate as normal. Other specific input routines could be used for the entry of dates, times, coordinates and so on.

General

Lots of other tricks can be used to make an educational program more effective. Figure II shows how loading files can be made easier. By looking at the disc and displaying only the valid options – everything in the J directory – the software prevents users from selecting a non-existent file.

Notice the extra information displayed about each file – obtained by opening each one and reading a number from it. When using this file selection technique, it may be required that you allow for a disc swap by providing a *Change Disc* option on the menu.

Always use ON ERROR to trap and handle errors – it is always possible that a disc error or similar could occur and your program shouldn't simply crash if it happens. Expect the unexpected.

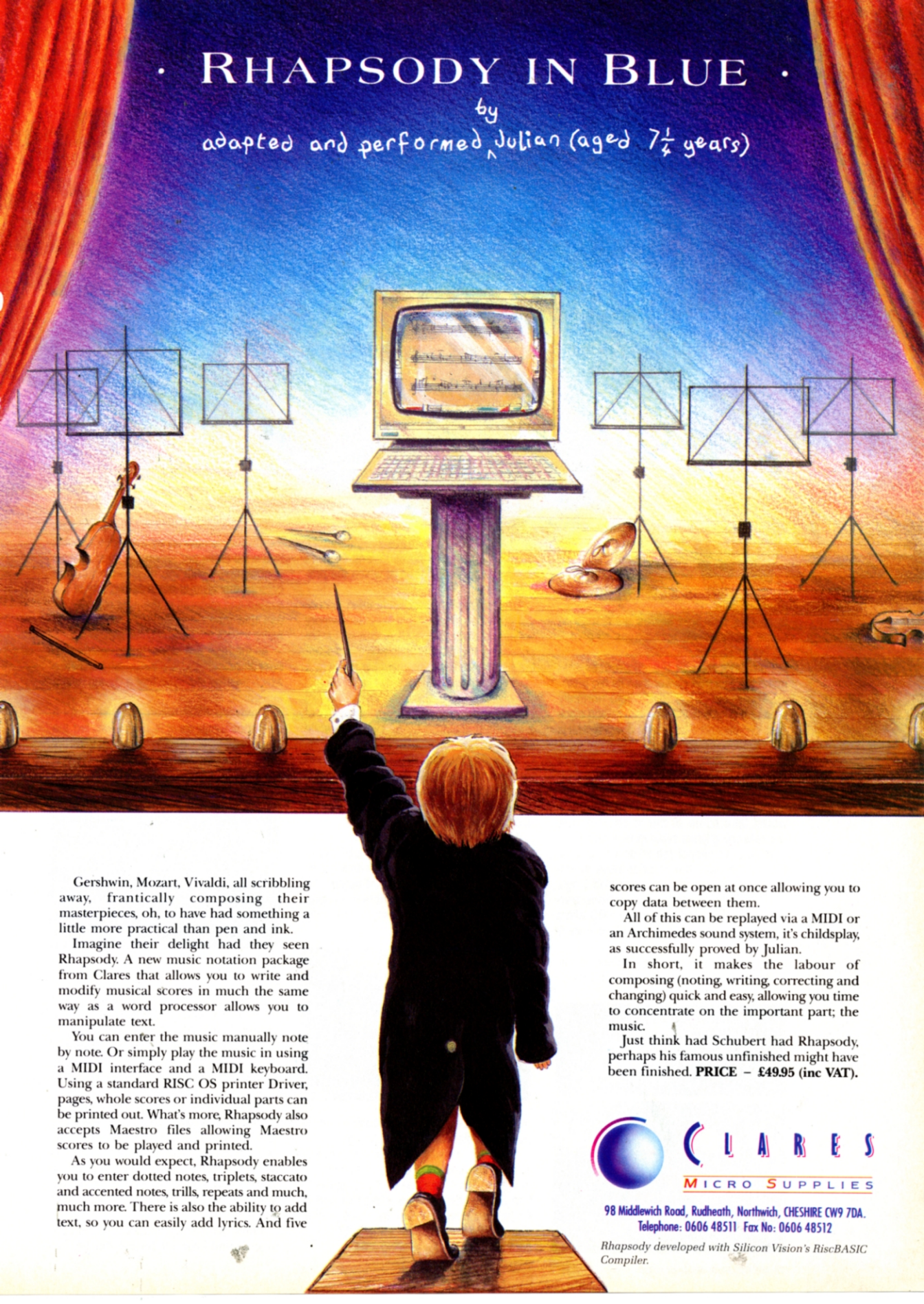
If your software is to send data to a printer, use one of the *Is a printer connected?* functions to prevent the computer from locking up if there isn't. Trap Escape at all moments – perhaps turning it off at crucial times – and try to cope with the Break key, even if you just use *FX200 to completely wipe the memory.

This advice is far from exhaustive – entire books could be written on the subject. However consideration of these issues will help you to write software which is good to use with a minimum of fuss.

· RHAPSODY IN BLUE ·

by

adapted and performed Julian (aged 7¼ years)



Gershwin, Mozart, Vivaldi, all scribbling away, frantically composing their masterpieces, oh, to have had something a little more practical than pen and ink.

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Tony Oakden reveals some very clever tricks for making the Electron work faster

Electron overdrive

WHILE the Electron is the slowest member of the Acorn range of machines it is still possible to write good arcade games on it. In this two part series we'll look at some really clever techniques to give it go-faster stripes.

First let's look at the differences that make the Electron slower than its big brother: The heart of the BBC Micro normally runs at a speed of 2MHz – two million clock ticks per second – but slows down to 1MHz when accessing peripherals.

The Electron, however, starts out running at 1MHz and is slowed down even further because it uses cheap (slower) ram and has fewer dedicated processors which would take some of the more mundane housekeeping tasks away from the 6502.

A very significant reduction in speed is caused because the Electron uses a custom chip called an Uncommitted Logic Array (ULA) to carry out functions performed by the 6845 chip in the BBC Micro which forms the heart of the video display circuitry.

On the BBC Micro it runs independently of the 6502 and accesses the display memory on alternate clock cycles from the 6502, and so does not affect the speed at which the processor runs.

On the Electron the ULA is used to control the video display – in fact, all memory access is through the ULA. But when it's accessing the display memory it locks out the 6502 and slows the machine down to a third of its speed in Modes 0, 1 and 2.

However, there are some novel ways of increasing the effective operating speed of a standard Electron by 50 per cent while working in the slow screen modes.

The same techniques also make it possible to recover variable amounts of memory from the screen display without it becoming visible as the coloured band that spoils the appearance of many Electron games.

The 6845 contains registers which can be reprogrammed to enable the BBC Micro to generate a video display with dimensions different to that of the standard modes. So the parts of display that contain the program are not displayed. Unfortunately the ULA in the Electron is only capable of generating the standard displays modes.

But there *is* a way of preventing the hash of program data from being displayed: By redefining the colour palette it is possible to turn all the colours black while this part of the screen being sent to the video output. The palette can then be switched back to normal to display the playing area.

This switching must be done every time the display is built up by the video circuits, that is 50 times per second. It must also be synchronised with the display so that the colours are always black at the top of the screen and restored in the right place. We'll call this method a Colour Chop, and to make it work we need an interrupt.

An interrupt is a signal to the central processor generated by external hardware which informs the 6502 that a device needs immediate attention.

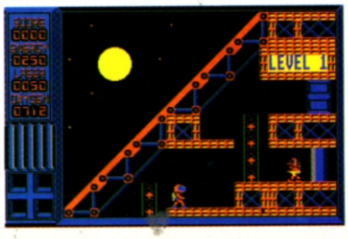
When the 6502 receives an interrupt it suspends whatever it is doing – called the foreground task – and executes an interrupt service routine. Upon completion of the service routine the 6502 returns to the foreground task.

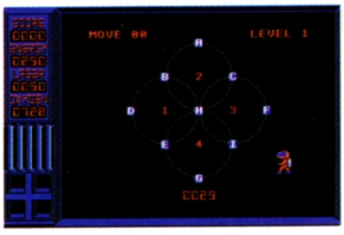
The simplest way to illustrate this is to imagine a woman reading a book (foreground task) when the phone rings (an interruption). She stops reading and answers the phone. When finished, she puts down the phone and starts reading again.

Two types of interrupt are available: Maskable interrupts (IRQs) and Non-maskable (NMIs). The NMI is used extensively by high priority devices like the disc drive, while the IRQ is used to control functions like the keyboard scan and the sound system. It is the IRQ interrupts that we're interested in.

When an interrupt is detected the 6502 jumps to an interrupt service routine. The

The techniques described in these articles have been used by Tony Oakden in his new game Star-Port soon to be released by Superior Software





address of this routine is contained at address &204,&205 – this is called a vector.

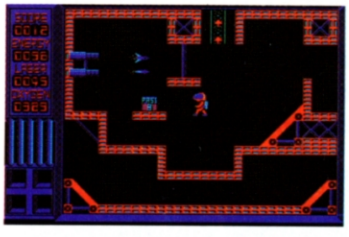
Normally this vector is initialised at startup to point at the standard operating system routine for handling interrupts. By pointing the vector at our own routine we can modify the way in which the operating system behaves.

All interrupts in the unexpanded Electron are handled by the ULA, and two of them are of particular interest to us – the Display End Interrupt (Vsync) and Real Time Clock Interrupt (RTC).

Vsync is generated 50 times each second to coincide with the screen beam flyback. It is most often used to synchronise sprites and colour changes, and is available in a similar form on both machines.

The RTC is peculiar to the Electron, and is generated by the ULA. It is also generated 50 times a second, but occurs .01 seconds after Vsync.

These two can be used together to control a Colour Chop routine. The technique works well, but can only be used to cut approximately 13 lines off the top, so games which use it tend to have long, thin



displays.

Listing I contains a routine to set up a Colour Chop for the Electron using the Vsync and RTC interrupts. It also contains a brief Basic listing which will be used in Listings II and III to demonstrate how the Electron's speed may be increased. The panel on the right describes the operation of the heart of the routine.

It is possible to redefine the colours using the machine code equivalent of FX115. However, even this takes time instead you can program the ULA colours to black using direct memory access – easily done, as the registers start at address &FE08.

The number of registers that need changing depends on the screen mode – two colours use &FE08 and &FE09, four colours use &FE08 to &FE0B and the 16 colour mode (Mode 2) uses all the registers from &FE00 to &FE0F. To blank the colours simply store &FF in the appropriate register. On the BBC Micro the registers are also in a ULA, but the way they are handled is different.

After the program has been run the Colour Chop will continue to function until Break is pressed. You'll notice that the line where the colour change takes place is rather unsteady. This is because the RTC can be delayed by other interrupts – most notably the keyboard scan using negative INKEYs also causes the Colour Chop to move. What happens is that the operating system sets the interrupt flag while it is scanning the keyboard – which prevents any other interrupt from occurring.

The best way round this is to disable all interrupts except the RTC and Vsync and scan the keyboard directly and operate the sound system by poking the register at &FE06.

Alternatively, a band of approximately one character can be left blank between the program overspill and the display.

● *Next month we'll look at how to check for key presses directly from programs and also a radical method of speeding up the processing speed of your Electron.*

How Listing I works the Colour Chop

Lines 300 to 370 contain the routine which redirects the vectors at &204,&205 to point at our routine. After this routine has been called any interrupt generated will be channelled through our routine.

Line 410 saves the values of the registers on the stack so that they can be restored when the interrupt has been serviced.

Line 415 checks bit two of the interrupt register at &FE00 to see if the interrupt was generated by the Vsync. If it is not set the program branches and checks to see if the interrupt was generated by the RTC.

Line 420 blanks the palette by setting all the colours – just two using Mode 1 – to black. This temporarily blanks the palette while in Modes 0, 1 and 2.

Lines 440 and 450 restore the registers and exit by jumping to the old interrupt handling routine.

Line 470 checks bit 3 of the interrupt register to find out if the RTC was responsible for the interrupt. If it is not set the program branches to the exit routine.

Line 480 and 490 restore the palette by resetting the colour registers.

```
   1 REM Electron Speed-up 1
   2 REM by Tony Oakden
   3 REM (c) The Micro User
  10 PROCassemble
  50 A%=163:X%=128:Y%=1:CALL&FFF4
  70 CALLsetint
  80 MODE1
  90 TIME=0
 110 PROCtriangle
 150 PRINTTAB(4,20);"NORMAL MODE ";TIME
/100;" SECS"
 160 STOP
 170 *
 180 DEF PROCtriangle
 181 GCOL 3,1
 182 FOR A=0 TO 1023 STEP 32
 183 MOVE 640-A,0
 184 MOVE 640+A,0
 185 PLOT 85,640,A
 186 NEXT
 220 ENDPROC
 230 *
 240 DEF PROCassemble
 250 FOR A=0 TO 2 STEP 2
 255 REM ASSEMBLE CODE INTO STORAGE ARE
A FOR ENVELOPES 5 TO 16
 260 P%=&900
 270 [
 280 OPT A
 285 \REDIRECT INTERRUPT VECTORS TO OUR
ROUTINE
 290 .setint
 300 SEI
 310 LDA&204:STAoldvector
 320 LDA&205:STAoldvector+1
 330 LDA#interrupt MOD 256:STA&204
 350 LDA#interrupt DIV 256:STA&205
 370 CLI
 380 RTS
 390 :
 400 .interrupt
 405 \SAVE REGISTER VALUES
 410 LDA&FC:PHA:TXA:PHA:TYA:PHA
 414 \CHECK TO SEE IF INTERUPT IS Vsync
 415 LDA&FE00:AND#4:BEQrtc
 416 \BLANK PALLET
 420 LDA#&FF:STA&FE08:STA&FE09
 430 .exit
 435 \RESTORE REGISTER VALUES
 440 PLA:TAY:PLA:TAX:PLA:STA&FC
 450 JMP(oldvector)
 455 :
 460 .rtc
 465 \CHECK TO SEE IF INTERUPT WAS RTC
 470 LDA&FE00:AND#8:BEQexit
 475 \RESET PALLET
 480 LDA#&34:STA&FE08
 490 LDA#&35:STA&FE09
 500 JMPexit
 510 .oldvector:EQUW0
 520 ]
 530 NEXT
 540 ENDPROC
```

Get it right ✓

```
  1 =    0 0    183 =  509 6    310 = AD8B E    435 =    0 3
  2 =    0 0    184 = 2290 C    320 = 1F8B F    440 = F4CE 7
  3 =    0 0    185 = 2336 D    330 = 6AB3 B    450 = 3D0D F
 10 = 126A A    186 = 2C83 2    350 = F054 1    455 = 9719 F
 50 = A7A7 F    220 = ED0F F    370 = D5B1 6    460 = BB24 5
 70 = CAF4 1    230 = 8528 9    380 = 9843 A    465 =    0 5
 80 = EA3A 4    240 = 98A5 5    390 = 9719 6    470 = 46C6 6
 90 = 173E 1    250 = FCB5 0    400 = 83BD 3    475 =    0 6
110 = BAAD B    255 =    0 0    405 =    0 3    480 = 2897 B
150 = 9D9D 0    260 = C92F 7    410 = D8B9 0    490 = 57F3 6
160 = 4E55 3    270 = EB9E 1    414 =    0 0    500 =  45C C
170 = 8528 8    280 = DDA7 9    415 = 4145 D    510 = B40E 7
180 = 3062 2    285 =    0 9    416 =    0 D    520 = 8B58 E
181 = 38CB 4    290 = 76C1 8    420 = 93A9 7    530 = 2C83 D
182 = D8ED 4    300 = 2C4A 7    430 = DC83 3    540 = ED0F F
```

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Hac Man studies the old and the not so new

Ravenskull Helpline

Regular readers may remember the January and February 1989 issues in which I featured a full solution to level 1 of Superior's ever-popular **Ravenskull**, and also June 1990's call for help with level 2.

To my rescue have come Alan Busvine of Brislington, near Bristol, and Bill Hensman of Keighley, Yorks, with full solutions, an amalgamation of which, starts forthwith:

From the start go north and immediately west at the crossroads into the room that you can see to your west when in your start position. Collect the two treasure pieces from this room, avoiding the lethal spikes.

Leave the room via the other exit and follow the narrow passage north and then west. As you make your way along this corridor you will trigger a gate blocking your exit, but worry not, because you don't need to retrace your steps. Turn south then east.

A piece of treasure and a key will be visible, but ignore them for the moment. Almost at the eastern end of this passage is a treasure piece. Take it – but do not go down the passage that it obstructed.

Instead continue east a couple of steps, and then go south between a pair of spikes to a boulder. Go west and take the second exit north. The first is the passage that was previously obstructed by the treasure piece mentioned above.

Don't enter it from this end either. Likewise, don't be tempted by the piece below the boulder just yet: It too is protected by a slamming door.

Go west again at the first opportunity, just below the spike. Go as far as you can along this passage, ignoring the gap above the treasure piece – if you enter it you will trigger a spiked star immediately above you so that you cannot escape from this room.

Collect both scrolls from this room, making sure that you pick up the left-hand one first. Leave by the route you came in, and retrace your steps going east and then south.

Approach the treasure piece below the boulder until the door has slammed shut behind you, then use and discard the first scroll. It increases your strength, so that you can push the boulder out of the way.

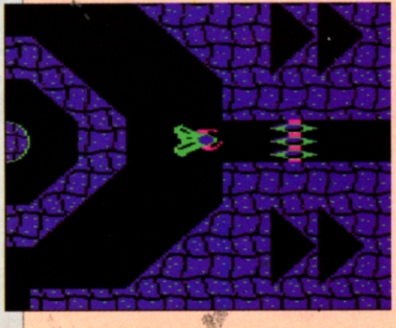
Move the boulder, go west – following the route you took earlier – and then north to pick up the key and the treasure piece.

Use your remaining scroll to transport you to the south-east corner of this level. Discard the scroll and proceed west, following the passageways.

Now it is largely a matter of careful exploration. The only trap is the gate that closes behind you when you take the westerly exit north of the room full of man-eating plants.

Make sure that you have picked up the scythe before leaving this area. Go west and you'll find yourself back at the crossroads to the north of your starting point.

Part two of the solution to level two of Castle Ravenskull will follow in next month's issue. See you then.



Ultimate lupine

I recently received a letter from Londoners Simon Karger and Jeremy Flax, who point out a feature – or bug – that they have found in Ultimate's **Sabre Wulf**. They say that if you find your route blocked by an indestructible guard you should go back to the screen from which you came, wait for 10 seconds then return to this screen: The guard will have disappeared.

This character is the native that guards the small house two map squares above your start position. It only appears if you have not collected all four parts of the Sabre Wulf amulet.

I played the game deliberately avoiding all the clearings that I knew might contain fragments of the amulet, and sure enough arrived at the finishing location with just one part. I then followed Simon and Jeremy's instructions to the letter, but could not make the guard disappear.

Perhaps Messrs Karger and Flax, or any other readers, could provide me with further instructions?

Incidentally, I have discovered that, in common with a number of other games, Sabre Wulf clashes with Computer Concepts' Spellmaster. Fortunately, the solution is not complicated – simply type:

```
!&210=!(!&FFB7+&10)
```

to disable the offending rom, and then start the game as usual.

WELCOME to another collection of goodies for all things arcadey. This month we are looking back a bit at a couple of classic BBC Micro games, plus a look at an Impact offering that I missed the first time around

James Harland and Simon Khoury have written to me from West Germany – or plain Germany as it will be by the time you read this – to ask for help with **Orbital**, Impact Software's Marble Madness lookalike.

When they wrote I had never seen Orbital, but Steve and Mark Botterill of Impact came to my rescue, and thanks to them I am now able to present the passwords and also a cheat routine for this game.

Before we get underway, however, I must point out the aspect of the game that first grabbed my attention. Regular readers may remember that in the October 1987 issue I featured a routine to allow Micro Power's **Imogen** to run on a BBC Micro fitted with an Opus Challenger disc system.

In the same issue was an Imogen cheat routine which let you to reset the number of metamorphoses in a saved Imogen data file to the starting value, effectively giving you an infinite number.

Also, in the January 1988 issue I featured a mini-upgrade for Icon's **Contraption**. All of these routines were written by one Jonathan Temple of Nottingham, the very same chap who subsequently wrote Orbital.

Anyway, enough of the introductions and on with the game: The documentation states that Orbital consists of 12 levels grouped into three sets of four. Once you have completed one set you are given a password to enable you to jump straight to the next set in future games.

After you have completed all 12 levels you restart level 1, except that this time the structure of each level is invisible. The full set of passwords is as follows:

Level	State	Password
1-4	(visible)	ORBITAL
5-8	(visible)	MIDGAME
9-12	(visible)	ENDZONE
1-12	(invisible)	WIPEOUT

If this is not enough to help you conquer the worlds of Orbital, try the following routine too. It provides a level jump facility, infinite or extra lives, and infinite time as well, making you invulnerable to the Octopodes.

It also includes a personalised high score table, a feature that has become very popular since I first re-introduced it with the Monsters upgrade in the March 1990 issue.

The listing works with all combinations of options on both the cassette and disc versions of the game. However, I noted to my considerable amazement that the cassette version of Orbital is not compatible with the Master series.

I compared the code of the two programs, and the disc version contains code that effectively says *If this machine is a Master do everything legally, otherwise don't*. Amazingly, the cassette version doesn't.

When you consider that Orbital was released only last year and that the Master had already been around for some years, I find it quite incredible that anyone should still be deliberately writing "illegal" code.

Although the Orbital disc is labelled BBC B/Master, while the cassette is labelled just BBC Micro and Electron, that's neither here nor there – there must be some Master owners without disc drives.

I have not included a Master conversion in this listing, but if any reader wants one I would be happy to feature one in a future column. Anyway, back to the game and watch out, Octopodes!

```
10 REM Orbital infinite/extra lives
20 REM infinite time, semi-invulnerabil
ity
30 REM and personalised hi-score table
40 REM for tape and disc versions
50 REM by Hac-Man 1990
60 REM (C) The Micro User
70 REM
80 S%=1:REM start level (1-12)
90 L%=3:REM total number of lives (1-25
5)
100 osargs=&FFDA:oswrch=&FFEE:osbyte=&F
FF4:oscli=&FFF7
110 A%=0:X%=&70:Y%=0:F%=USR(osargs) AND
 &FF
120 FOR I%=0 TO 2 STEP2:P%=&120:[OPT I%
130.lives STA &21:LDA# L%:STA &B8:RTS
140.start LDX# 0:.loop LDA &4E00,X:STA
&E00,X
150 INX:CPX# &D0:BNE loop
160 LDA# &A9:STA &123B:LDA# S%-1:STA &1
23C \ start level
170 LDA# &A9:STA &1290 \ infinite lives
180 LDA# &20:STA &15E5:LDA# &EA:STA &15
E8
190 LDA# lives MOD 256:STA &15E6:LDA# l
ives DIV 256:STA &15E7
200 LDA# 0:LDX# F%:CPX# 4:BEQ disc
210 STA &1B57 :\ invulnerable to Octopo
)l = des on tape
220 JMP time
230 .disc
240 STA &1B18 :\ invulnerable to Octopo
des on disc
250 .time LDA# &AD:STA &1267 :\ infinit
e time
260 LDA# &B4:LDX# &4D:LDY# 0:JSR osbyte
270 LDA# &8A:LDX# 0:LDY# &89:JSR osbyte
280 LDA# &BB:LDX# 0:LDY# &FF:JSR osbyte
290 LDA# &8E:JMP osbyte
300 :NEXT
310 DIM N$(8),S(8)
311 a$="  NOT HAC-MAN...  "
312 b$=" JONATHAN TEMPLE. "
313 c$=" IMPACT SOFTWARE. "
320 S(1)=&5000:N$(1)=a$
330 S(2)=&4000:N$(2)=b$
340 S(3)=&3000:N$(3)=c$
350 S(4)=&2000:N$(4)=b$
360 S(5)=&1500:N$(5)=c$
370 S(6)=&1000:N$(6)=b$
380 S(7)=&0500:N$(7)=c$
390 S(8)=&0250:N$(8)=b$
400 PROCtable:*FX 15
410 MODE 7:PRINT "Please insert Orbital
 tape or disc and press any key...";
420 G%=GET:PRINT
430 IF F%=4 THEN PROCdisc ELSE PROCtape
440 !&4D00=&524DFF0D:CALL &4D10
450 END
460 :
470 DEFPROCtable
480 FOR X=1 TO 8
490 N=(X-1)*24+&4E00:$N=LEFT$(N$(X),20)
500 S1=S(X) DIV &100 MOD &100:S2=S(X) M
OD &100
510 H=(X-1)+&4EC0:?H=S1:?(H+8)=S2
520 NEXT
530 ENDPROC
540
550 DEFPROCdisc
650 !&4D10=&0E8D60A9:!&4D14=&0A00200A
660 !&4D18=&8B8DA9A9:!&4D1C=&8D4CA90A
670 !&4D20=&2EA90AA9:!&4D24=&A90AAA8D
680 !&4D28=&0A1020C8:!&4D2C=&0E8D60A9
690 !&4D30=&550D2055:!&4D34=&0E8D20A9
700 !&4D38=&8D60A955:!&4D3C=&0E20558B
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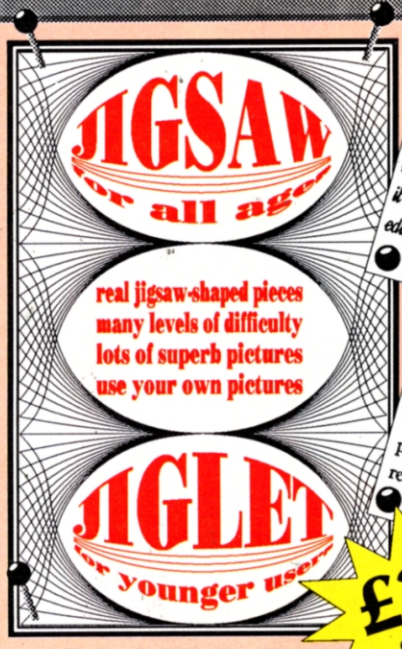

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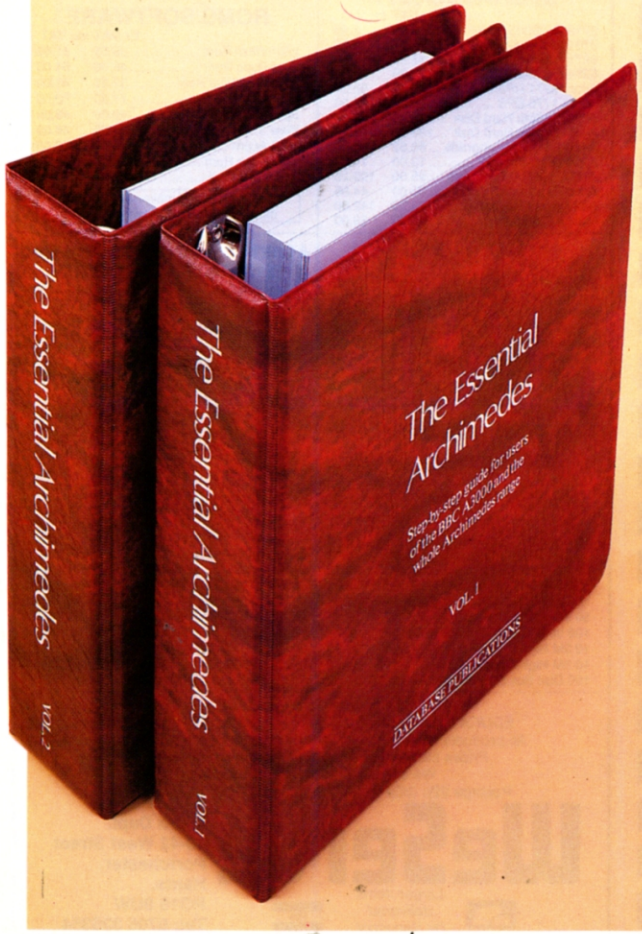

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Orchestrate your beep

Ian Waugh makes marvellous music with Hybrid's Universal Synthesiser

THE R&D department of Hybrid Technology, that bastion of BBC Micro musicware, has been brainstorming again. You can imagine the conversation:

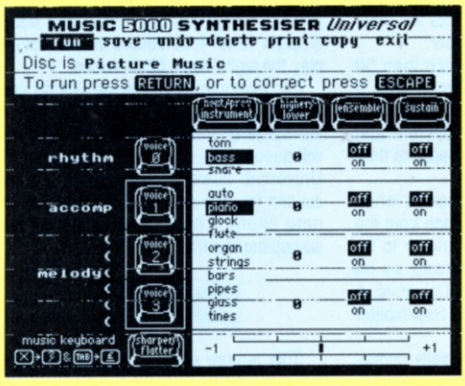
"What's wrong with BBC Micro music software today?"

"Apart from the beeps which come out the BBC's speaker, not a lot?"

"Right! Let's improve it!"

And that's exactly what they've done. The Music 5000 Synthesiser Universal – to give the device its full title – replaces the Beeb's beep with the sounds of the Music 5000.

The complete package consists of a Music 5000 Synthesiser, the Ample Nucleus Rom and some clever software which loads into sideways ram. It is fully compatible with the Music 5000 supplied with the Hybrid Music System except for a small enhancement which we'll go into in a moment.



Music 5000 Universal Synthesizer control screen

The system has been designed for use with a Master and won't run on a Model B. A Key Card is supplied which fits over the Master's numeric key pad. The software comes on an Issue disc which generates a Start-up disc in now-traditional Hybrid fashion. The process is relatively idiot- (and reviewer) -proof and even determines if you are using 40 or 80 track, single or dual drives.

When booted, the Start-up disc reveals a highly graphic control screen from which initial settings are made. You can play the sounds from the qwerty keyboard and alter them using the numeric key pad. The Key Card shows you which keys to press. There are 16 sounds available including four drums and each of the four voices can be assigned any instrument.

Other controls include Ensemble, Sustain and Higher and Lower keys. Ensemble adds a second voice to the original one to enrich the sound. Sustain adds a reverberant quality and has a similar effect to pressing the sustain pedal on a piano. The Higher and Lower keys raise and lower the pitch in octave increments.

Each setting is individually adjustable for each voice. Changes are made by holding down the voice number key on the key pad and tapping the Sustain or Ensemble key or a key to change instrument. You hear the changes as you tap the keys.

After booting the Start-up disc you are asked to insert the disc containing the music program you want to run. The system scans the disc for a fingerprint and then presents you with a list of around 50 music program names – it even included my book: Making Music on the BBC Micro.

Select the name and the Universal will load a set of default settings which suit the program. You can alter the settings and save them, using a new name if you wish. When you next run the Universal and insert that particular program, the system will recognise the disc and offer the same settings.

Some programs only use one or two voices. Universal will automatically link unused voices to play alongside, giving a fuller sound.

Predefined instruments – envelopes – can be selected in some programsto vary the sound. If you set a voice's instrument to Auto, Universal automatically substitutes each of the 16 envelopes for one of the Universal's instruments.

Product: Music 5000 Synthesiser Universal
Price: Complete package £113.85 Software only £33.35
Supplier: Hybrid Technology, 273 The Science Park, Cambridge CB4 4WE.
Tel: 0223 420360

Running a music program is amazing. Those you think sound good become brilliant and it even transforms the ordinary, the mundane and even the downright bad into something more appealing.

But there's more. Not only can you set up the instrument sounds for each music program but you can change those sounds from within the program even while it's running. You use the same keys on the numeric keypad and the aural clues enable you to hear your way around.

The BBC Micro's sound chip is decidedly out of tune, something you'll have noticed if you've tried to play along with it. The Universal has a pitch control which means you can tune the system to musical instruments. This is useful for aural teaching programs, too.

Another useful feature is the ability to ➤

print out the sound settings. This will work with any Epson-compatible printer.

The Universal supports more than 50 programs. The two most common ones it doesn't support – possibly the only two – are the Island Logic Music System and Peter Beater's Music Games, because they poke the sound chip directly.

The only problem I came across when using the system was interference from the Spellmaster rom, but this is known to be incompatible with other programs so no blame can be attached to the Universal. A software Unplug command on Spellmaster solves the problem.

Although the system is specially configured for use with existing music programs – they'll love this in education – you can, of course, use it with music programs of your own.

Using the Auto instrument setting means you can select any Universal instrument simply by changing envelope number. The potential for creating impressive music from Basic is enormous.

On closer inspection of the system you realise how sophisticated it is. For example, the software picks up on the envelopes' amplitude values and transfers them to the sound to create dynamics.

Also, the Music 5000 can play eight voices at once although, of course, the BBC Micro only supports four. Sustain, however, alternates between two voices and adding Sustain to all four voices would actually play the eight Music 5000 voices.

For example, if you issue Sound commands in Basic to play a two-note chord on the same channel, the BBC's sound chip will queue them or only play one note. The Universal, however, with Sustain on will sustain the first note thus producing a two-note chord. The instructions may look something like this:

```
SOUND 1,-15,52,0
SOUND 1,-15,68,60
```

This feature enables you to play eight-note chords. None of the existing programs can do this as it doesn't make sense using the BBC Micro's sound chip like this but it would be reasonably easy to write new programs which could.

In keeping with Hybrid's philosophy of only using legitimate programming techniques in order to ensure all-round compatibility, it's interesting to note that the Universal software is in no way a kludged system. It uses hooks which were built into the BBC Micro's operating system when it was designed.

Another little-known feature of the the machine is an external sound input on the 1 MHz bus which is documented in the Advanced User Guide. The Music 5000 connects to the BBC Micro via this bus and the enhancement to the Universal's Music 5000 allows the sound to be redirected to the BBC Micro's internal speaker. To do this you simply insert a special plug into the Music 5000's audio output.

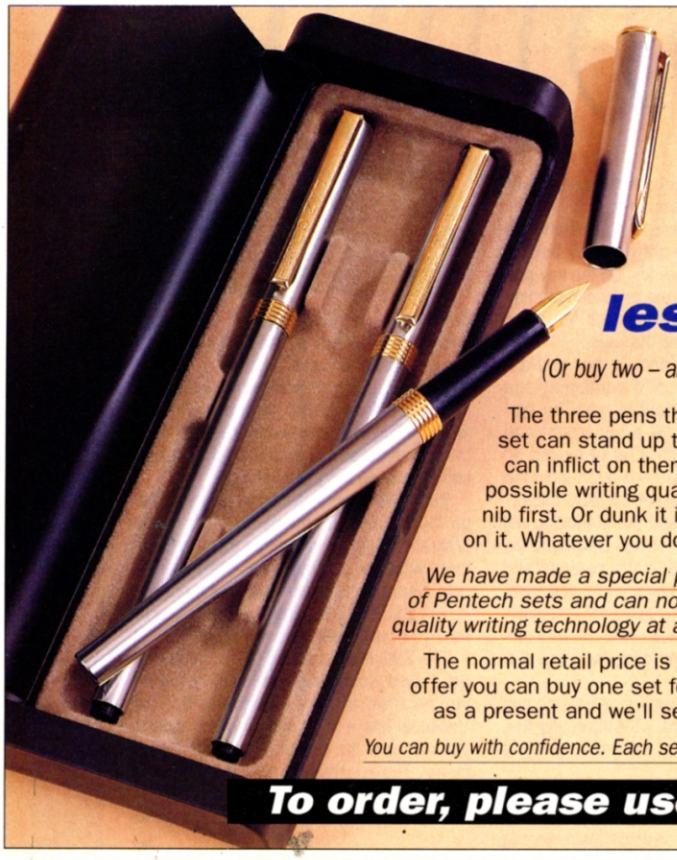
This makes the Universal a complete stand-alone system. Many schools use a music centre with the Hybrid Music System but it often has to be shared among other studies. Now they will be able to do class work on the Universal and plug it into the music centre for recording or performance work. Very cost effective.

As the Universal includes the Music 5000 hardware, you can upgrade to the full Hybrid System at any time.

Schools will love the Universal. It even had me going through my music program collection. The difference it makes is amazing. Sound on the BBC will never be the same again.

Summing up

A clever and ingenious product which adds a new dimension to virtually all BBC music software. An absolute boon for education.



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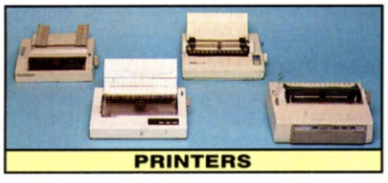
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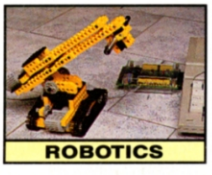
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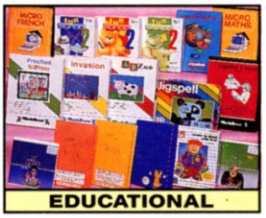
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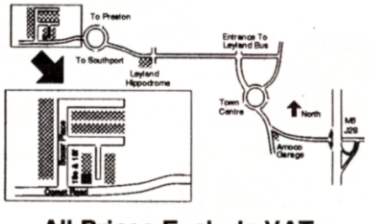

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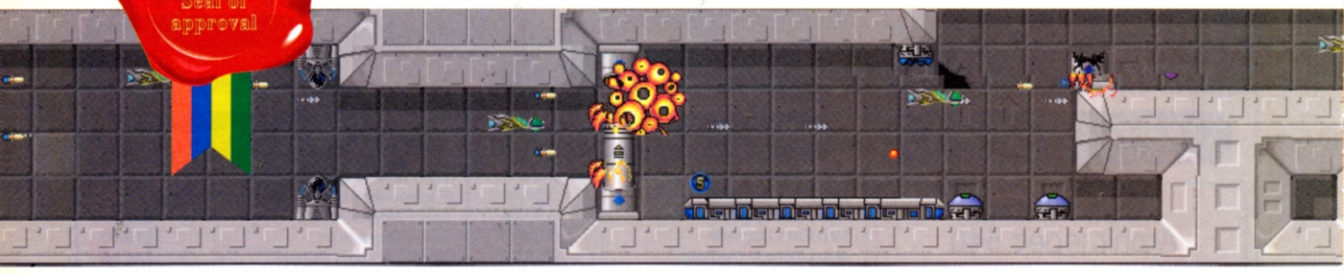

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The lethal discs

... mega blast mania

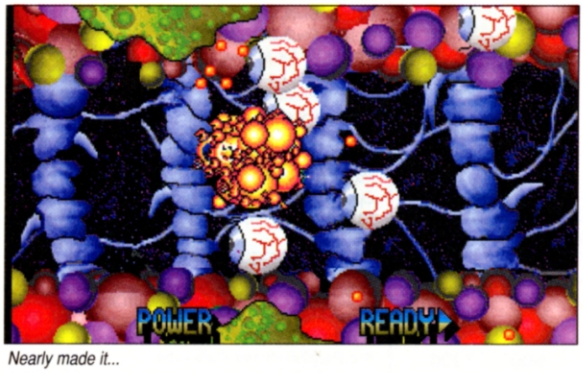
IF you still think that games for the Archimedes are a bit second rate, you're out of date because now there's Nevryon. In essence, the game is very simple. You control a spacecraft with the intention of rescuing the planet Nevryon from alien hordes.

In this horizontally scrolling shoot–'em–up you, the pilot, can fly your ship to all parts of the screen – although you can't bring it to a standstill.

As you fly on your first mission, above and within the surface of the planet, it seems as if the whole armoury of the universe has been flung at you. Snakes, bullets, fizzers and flames are all bent on the destruction of your V5 fighter.Pitted against that little lot you do your level best with a basic cannon.

However, as you might expect, as you struggle on you can collect tokens which give you an opportunity to beef up your armoury. There are additional primary weapons which fire very frequently and covera much wider area.

Getting to the mega blasting bit, you can acquire secondary weapons. These include smart bombs, mines, force fields and flamers and are operated by a separate range of keys. Only one type can be used at a time.



Nearly made it...

Hovering defence pods come in handy, too. These are indestructable and make your task a great deal easier since most of the alien attacks will now cause you no damage.

Inevitably, damage there will be, eventually resulting in the loss of one of your craft – you have only four to complete all the missions.

Having forced your way through the opposition you come face to face with a kind of guardian at the end of a tunnel. This beast is fantastically well defended and great skill is required to get your V5, which can now hover, close enough to beat this fearsome adversary.

This brings you on to mission two, in which you are still flying through tunnels and destroying the defences. The graphics are quite different here and add more atmosphere to the game. Level two ends with another strongly defended tunnel and end guardian. Beating this one will give you a password to start on mission three.

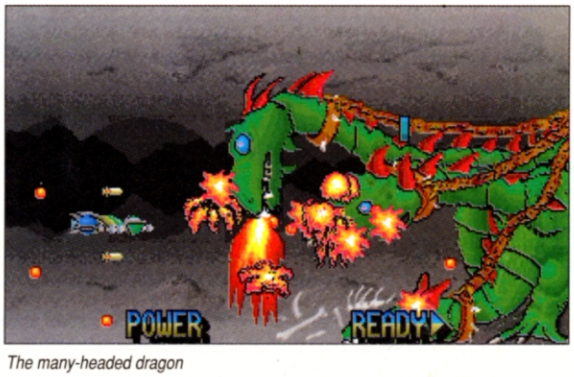
The third task is quite different, involving a meteor storm. Not all the meteors are mere rocks though. You will soon be surrounded by baleful bats and a real fight for survival begins. Oh, for another half dozen smart bombs.

Level three was as far as I got to date, but there are five more tasks to look forward to, including fights within a huge battle cruiser and with a giant alien monster.

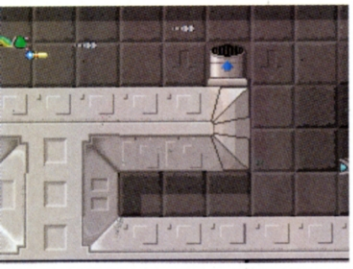
The game offers a vast array of options. Firstly, there are three skill levels: **Timid** gives you craft loads of power but you score points rather slowly, while **Ace** allows you to accumulate a good score rapidly – you need to, since your craft quickly disintegrates.

The game keys are completely user definable, or you can use a mouse or two types of joystick if you wish.

At the end of a game you can opt to start again from the beginning or keep the secondary weapons you have collected. This is certainly a help when you're aim-



The many-headed dragon



ing to top the high score table – which can be saved on disc or kept for just one session.

Nevryon features the best graphics and sound I have ever come across. All of the superb sprites are packed with amazing detail and the animation and scrolling are completely flicker–free.

Six different full stereo pieces of music add greatly to the atmosphere, and you can set their level to suit you. The sound effects, too, are of the highest quality.

In style, this game is rather like some BBC Micro Golden Oldies such as Rocket Raid, but the graphics and sound transport it into an entirely different dimension.

It is very hard to stop playing Nevryon and that's normally the

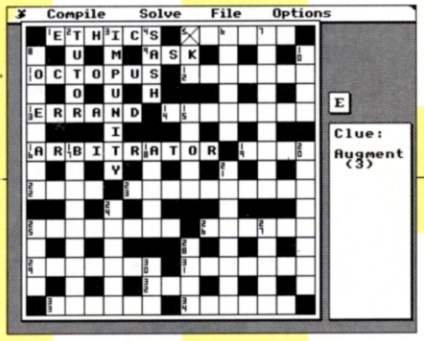
hallmark of a classic. If you are into somewhat thoughtful shoot–'em–ups dash out and buy it. You won't be disappointed.

Rog Frost

Graphics	10
Sound	10
Playability	10
Value for money	10
Overall	10

XWORD

... never a cross word



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WHEN your blaster has overheated from too much zapping and you've nuked your last ninja, why not hang up your joystick and flex some mental muscle instead?

XWord is a new program from Panda Discs that offers many of the things that previous crossword programs have provided, but does so bigger, better and with style. The latter is immediately evident as you boot up and find yourself looking at your lowly BBC Micro doing a more than fair impersonation of an Apple Mac!

The black, white and grey desktop is used to good effect throughout with all the program's options tucked away behind pull-down menus.

Crossword compilation is a multi-stage process that can be automated by various degrees, if it all begins to prove too taxing for you.

Step one is the creation of the grid. Having specified the appropriate dimensions, you can either blank out specific squares yourself or press a couple of function keys and watch the program do it for you. Once complete, the grid is numbered and saved to disc.

Step two is the mentally taxing and tiring part of the whole program – the assembly of the words to intertwine within the confines of your new grid.

Impressively, XWord will take any word that you suggest and attempt to fit it into the puzzle, it will even search its own disc-based dictionary and offer a list of possible choices. You can append words to the crossword dictionary at any time.

With a gridful of words, all that remains is to add the appropriate clues. For ease, the grid is dispensed with and a word list displayed down the left of the screen, the right side being reserved for your clues. This is one of the few functions that you must perform without any assistance.

Previously created puzzles may be solved onscreen or dumped to paper for solving in the more conventional way. This hardcopy option is most useful in the educational environment, where multiple copies of a puzzle can be produced, giving the whole class access to the puzzles.

The program can also be used to create specialised crosswords to supplement classwork in specific subjects.

Onscreen puzzle solving is performed by moving a cursor around the grid and inserting the correct letters in the right positions. As is the norm for this type of program, a veritable battery of cheat routines are available to assist the hard of thinking.

Panda are offering puzzle discs at a later date, but I would like to take a look at some of these before passing judgement on XWord's long term appeal. However, at first glance it appears to be a polished package that should sell well.

Jon Revis

Graphics	N/A
Sound	8
Playability	7
Value for money	7
Overall	7

DOUBLESTAR

Last Days of Doom and Hezarin

Price: £19.95 (80 track disc)
Supplier: Topologika, PO Box 39, Stilton, Peterborough PE7 3RL.
Tel: 0733 244682
Requirements: Available on all Acorn formats

TOPOLOGIKA have had this two-game production in preparation for some time. Cause of the delay was the time needed to put the finishing touches to **Hezarin** – the free bonus game – of which more anon.

Most seasoned adventurers will know that Topologika have taken over the combined mantles of Acornsoft and Level 9 as far as text adventures are concerned, and the quality of this product shows why.

Well packaged and presented, with on-line clues – and even solutions for the desperate – Brian Kerslake's company have once again come up with a top quality offering.

Last Days of Doom completes Peter Killworth's entertaining trilogy of adventures centred on that pestiferous planet Doomawangara with its vile volcanoes and grotty gravitation.

Something is causing Doom to teeter towards total destruction and so you, your trusty – and irritating – robot dog, plus three companions, make a somewhat haphazard landing on the planet to see what can be done.

The tension mounts rapidly because Peter Killworth has a move-counter in operation for the initial stages. Once the ship has landed it slowly slithers to destruction and it's a question of moving fast to save what you can.

One or two old friends from the first two episodes appear – with differences – so that once again there is the black rod topped by the rusty star to be found. It's not altogether an earth-shaking discovery, but is well worth a wave. Done in the right place, it can even retrieve your retriever.

In the same way, blobs turn up. Once again they are associated with time travel, though on this occasion rather than entertainment, it produces a disturbing effect. Well, who likes to watch oneself die? Mind you, the dog can be of help here and VAT can be construed as Vitality Added in Time.

I heard the other day of a young girl who preferred radio to TV because, she said, *the pictures were better.* That's not as daft as it sounds, and – to my mind – good text plus a good imagination still equals, or betters, illustrated adventures. Let me give you a flavour, with a typical location description.

You are standing inside the city, in the middle of a street which leads north and south. To the west once stood an entrance, but rubble and the occasional hint of lava are all the remaining signs of it.

You can see the cracks in the street surface, obviously of recent origin. The rumbles of Doom's interior are having an effect here too!

Around you are high, featureless walls of some stone-like material, many with cracks extending to the rooftops. Dead leaves blow through the area, giving it a mournful deserted feeling.

Now how's that for a description brimful of atmosphere? **Last Days of Doom** is a complex adventure ideally suited to moderate-to-experienced players, though the readily available help means that beginners don't have to feel excluded from this quality offering.

Here are a few cryptic clues: Breaking a globule in the right place may cause a cold – but it's worth it. You may feel sick but heaving away can help with a current problem.

There's one phase of the game where you'll literally have to blast your way through the local environment – and you can finish up all fingers and thumbs if a bit of reservoir battering is not undertaken.

Now on to **Hezarin**. I saw an early version some time ago and expressed surprise when Jon Thackray told me that it was to be included as a freebie. Frankly, I felt it was quite capable of standing alone.

It says something for Topologika that they have kept the two games together – and that fact is reflected in the value-for-money rating below.

Hezarin is loosely based on the Epic of Gilgamesh, though you don't have to be a theologian or a student of ancient near-eastern civilisations to enjoy this very satisfying and complex adventure.

You start off above ground and there's plenty to explore there, as well as vital things to locate.

As with Doom, the location descriptions are full and highly literate, as this example indicates.

You are in an immense hemispherical chamber with exits in most directions. Dominating the cave is a massive stone fountain from which columns of water jet up almost to the ceiling before spraying back into the ornamental pool beneath.

Light filters in from a hole in the roof, and refracts in strange fashions inside the water columns, sending dazzling blobs of colour scampering across the cavern walls. The floor is covered in a springy moss-like substance which hampers walking, especially as watching the psychedelic kaleidoscope is making you dizzy and nauseous.

Read that, shut your eyes, and you could be listening to the water and in awe at the colours. In fact, the fountain has visible properties as the description indicates, and is an ideal haven for small amphibians.

Again, I offer a few cryptic clues. You'll encounter a Poohsticks bridge – and don't be afraid to have a go at that classic game. If at first you don't succeed, try, try again.

You'll have trouble with Orcs. Make good use of your sense of hearing ,and if you hear an explosion try retracing your steps. Last, but by no means least, don't be afraid to WAIT – even if you feel under pressure.

Both games have a parser which allows multiple input of a quite complex nature, and Hezarin has an Oops facility allowing you come back to life if you do something fatal. A new instruction permitted is Back, which allows you to retrace your steps.

What Topologika has presented us with here is an absolutely first-class double package, the like of which I've not come across before. It is an absolute must for any serious adventurer: Pass this one by and you must be mad as a...

Mad Hatter

Graphics	10
Sound	10
Playability	10
Value for money	11
Overall	10

THE OLYMPICS

... sporting Arc

SPLIT over two discs, the 4th Dimension present sporting action on the Arc. A heavily rhythmic version of Chariots of Fire fades to reveal a well-designed main menu from which all game options are controlled.

Up to eight players can take part in one stadium session, and you can choose to compete in all the events or in a personal favourite. You cannot select a specific order of events.

Fortunately, the practice option compensates. Removing the conventional Gold, Silver, Bronze medal-winning paraphernalia, this allows an armchair athlete to concentrate on familiarisation with his chosen sport.

Plunging for the *compete in all events* option, takes you to the pool and the Diving event. The miserably enforced regime of Z, X key abuse is re-lived here, as each player takes a go at the four dive types.

After each attempt a set of scores flash up to reflect the international judges' impressions which are controlled by your skill in executing the forward, backward, reverse or inwards plummet and the difficulty you choose. Despite the smooth scrolling, I wasn't at all excited.

Welcoming the mouse back, you go Shooting – the clay pigeon variety. Having established your preferred sight speed, you choose to take 30 targets randomly or in a predetermined order. The latter enables you to memorise directions.

Enjoyable as splitting flying white blobs is, the gun holder flickers and it's even possible to achieve the ultimate goal of killing two birds with one shot, as on-screen collision detection is pretty generous.

The Javelin event is my favourite – the athlete sprinting motion is good and the game demands good judgement rather than key-punching. By carefully releasing and angling the javelin with the mouse, you can reach quite respectable distances.

Should you manage a throw nearing the world record length, authenticated "crowd-reaction" screams out of the Arc's speakers, which lends a nice touch of atmosphere.

Back to the pool starting blocks and more key abuse where you have to tap out the beat for the swimmer to stroke to. Keep him breathing by regular stabs at the Return key. However, to plough speedily through the water means developing a regular rhythm, as prompted by a flashing panel.

The instructions warn that a lot of practice may be required to maintain a good speed. This is an understatement.

Staying in the water you are now trasported to a foaming river, complete with canoe. Course types are: Short, featuring 5 gates, Intermediate with 10, and Professional at 15. Underwater current behaviour can be shifted between none and random.

Desperately trying to remember the gate types – colour coded according to how they should be negotiated – progress is slow. The coaxing of the canoe is with repeated use of the ' and / keys, but beyond the irritating "blips" used to signal collisions, stimulation is thin on the ground.

Finally, Pole Vaulting runs along similar lines to the Javelin event. After you have chosen the bar height, the brave sprite jogs up to the daunting gantry. On command of the mouse, it lowers the pole and rises skyward.

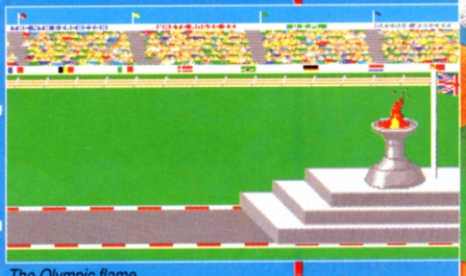
All of the player's involvement takes place in these few split seconds, and it becomes an increasing challenge to gently flop over the ever-rising height.

On the occasions that sound is employed, it is used well. A good example is the convincing glug echoed upon failure to breath in the swimming event. The game's backgrounds often have a fuzzy appearance. However, they suffice, and animation is usually smooth and well articulated.

Overall though, attempts to spice this software's appeal with player nationality quirks and a ceremony sequence are overshadowed by a meekly-coded Archimedes game design.

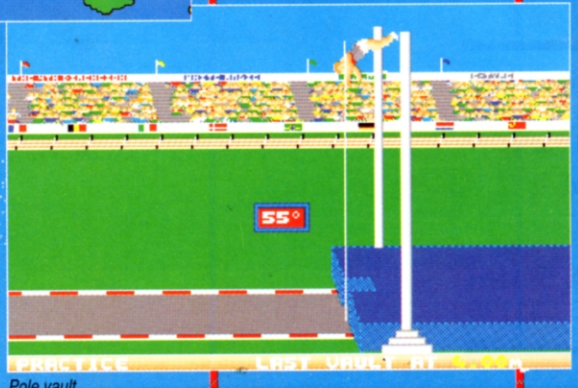
Matthew Ridd

Test your Canoeing skill



The Olympic flame

Clay pigeon shooting



Pole vault

Price: £19.95
Supplier: The 4th Dimension, 1 Percy Street, Sheffield S3 8AU.
Tel: 0742 700661
Requirements: BBC A3000 or Archimedes series

Graphics	6
Sound	6
Playability	5
Value for money	5
Overall	5

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£27.95

Investigator 2 is an improved version of the powerful disc utility program from The Serial Port which is compatible with the Archimedes series of computers.

Investigator 2 has all the features of the original plus many enhancements including the following:

- ▲ Runs from the desktop
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- ▲ Detailed manual

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A word in your ear...

Ian Waugh tells of a new way of adding speech to programs

COMPUTER and robotic speech is the stuff of science fiction. The spectacle of seeing – and hearing – a machine converse, apparently intelligently, with a human holds a fascination for most people, especially micro users.

Human speech is a conglomeration of a myriad of pitches, tones and inflexions and any attempt to duplicate the dulcet tones of HAL in 2001, for example, is not a task to be tackled lightly. However, given suitable hardware and software, a convincing attempt at computerised speech is quite possible.

Enter Speakeasy II. This is a hardware unit based around an electronic model of the human vocal tract. Readers with long memories may recall Speakeasy I which was launched in 1980 and based on the SC01 synthesiser chip. Speakeasy II uses the newly-designed SSI263 (SC02) controlled by a HM64180 microprocessor which gives more intelligible and clearer speech.

It's as well to point out now that the unit is primarily designed for systems applications such as industrial alarms and machine feedback. It has its own on-board, battery-backed CMOS ram which can store and speak up to 64 messages.

These can be activated by logic input lines so the unit can easily be triggered by mechanical operations as opposed to software instructions.

> *'There are codes for selecting the pitch so you can make the machine sing'*

The full unit contains its own speaker plus a mini-jack socket for connecting to an external speaker. Software communication with the BBC Micro is via the RS232.

The manual and software supplied reflect the systems applications it was designed for. In truth, they could be a little more helpful. The programming software is based around a version of Forth, although an emulator program allows words and phrases to be constructed fairly easily.

Speech is created phonetically using phonemes, and the unit is programmed using a phonetic spelling system closely related to the Arpabet phonetic alphabet which the manual calls Starpabet. For example, *HELLO* is represented by *HHEHLOW*. Even following the phoneme list, it can take a while to create satisfactory pronunciations.

There are instructions to raise and lower the pitch and produce a gradual pitch alteration. The manual devotes a couple of pages to phonetic programming – learn all about allophones, dipthongs, fricatives, affricates and liquids – but lacking are actual examples of words, which would have been helpful, even though the manual contains a supplementary guide on phonetic programming of the SSI263.

You can program the synthesiser chip directly using phoneme codes. "Hello" then becomes a 47-character instruction. This may seem to be one for the dedicated or the optimistic, but more realistic speech is possible using this method and for a system which only requires a small number of messages, the extra work required for the added realism may be worthwhile.

The software includes codes for directly selecting the pitch so you can make the machine sing. Here's "Daisy, Daisy" from the song of that name:

```
19DEHEYEY 16IZIYIYIY 12DEHEYEY 6IZIYIYIY
```

When you're happy with a phrase you can save it into one of the unit's 29 internal buffers which are supported by the internal battery. These are of limited length – 256 bytes – but enough for several words.

You should be able to recall the contents of these buffers even after the unit has been switched off. The review unit retained the buffers after switching off for a short period but lost the contents after being switched off overnight. It had seen heavy review duty, so perhaps a fault had developed.

The software includes a Receive command to load a file into memory, allowing you to create words outside the emulator program. This, however, is not for the faint-hearted, as you have no aural feedback on the words you are creating *and* the data is expected in hex code.

The software lacks a save command – it should be Transmit – which means you can't save the words you create to an external medium such as a disc, although, as mentioned, they can be stored in the unit's buffers.

No demo files are supplied, which is a great shame, but an even greater miss is an English-to-phoneme conversion program which would let you enter words in English, convert them and speak them.

The speech quality is clear – as long as you've programmed it well – if a little grainy, although the internal speaker produced a considerable hum.

Product: Speakeasy II complete
Price: £402.50
Product: Speakeasy II circuit board only
Price: £310.50
Supplier: Sands Technology, Orwell House, Cowley Road, Cambridge CB4 4WY.
Tel: 0223 420288

The unit is made in small quantities and the price reflects the low production rate. I'm sure many home users would like to hook this up to their micro, although I still can't get it to talk like Glynis Johns. Imagine linking it to a pop-up desk diary, notepad or clock. You could even wire it to your front door to welcome you home: "Gooood evening, Sebastian..."

The price, however, plus the rather unfriendly programming method, is likely to deter most home users although, again, I must point out that this is not its main market. But as an aural feedback unit for industry, Speakeasy II has many practical, novel and safety applications. Anyone with enough knowledge to fit the unit into a system could also probably cope with the programming.

Summing up

A remarkable unit with great potential, capable of a wide range of vocal inflexions and intonations. It could provide genuinely useful spoken feedback for a number of industrial applications, although the programming software could be improved.

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Other attempts have been made to expand the A3000 by trying to introduce a 'mini-podule'. This is impractical for many reasons, amongst which is the reluctance of manufacturers to produce them. Nobody wants to re-design podules already produced. Some cannot be produced on a 'mini-podule' as they are far too complicated and simply wouldn't fit.

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Since the ULTIMUM Podule Racking System takes proper full size podules, you will be able to use any of the currently available peripheral equipment, from companies like Computer Concepts, Armadillo, Acorn and of course, our own brand.

Fitting the podules to 'ULTIMUM' is simple. They are neatly fitted inside the metal case of the rack, avoiding the previously untidy method of hanging the podule off the back of the computer, risking damage to both, it and to the computer.

'ULTIMUM' has its own power supply, so no strain is put on the A3000 power supply. There is also an IEC mains output socket for an Acorn type monitor so reducing the number of plugs required to go to the mains. The ULTIMUM is rigidly clamped over the top and under the computer, and allows direct access to the floppy disc drive and reset button, rather than obstructing access as on other systems. One can also place a standard monochrome or 14" colour monitor (even a multiscan type) safely on top. The mounting method employed is so firm that the computer could even be safely transported without the assembly falling apart.

By popular demand, we are now able to supply refurbished and fully guaranteed, Acorn range of Micros.
(Please telephone for price & availability)

Archimedes to BBC Serial Link Mk 2

Using this simple data link, it is possible to solve all your BBC to Archimedes data transfer problems. The kit is supplied with a disk, and the necessary cable to connect the two computers.
New RISC OS Version **Only £15**

Archimedes 5.25"/3.5" Disc drive Interface

With this interface it is possible to connect almost any 5.25"/3.5" disc drive with its own power supply to the Archimedes. Upto 4 disc drives can be connected. NO SOLDERING is involved. Supplied complete with necessary lead.

Only £21

Special Education Prices

All education establishments qualify for special education prices on micros, etc. Please write in or telephone (0923) 37774 or 50335 for written quotation.

BBC MASTER

MASTER 128K Micro incl. Acorn's View, Viewsheet, ADFS, BASIC Editor & TERMINAL plus FREE OFFER (see below) **£399** *(carr £7)*

FREE OFFER

A 5.25" Double Sided, 40/80 track switchable 400K Disc Drive complete with cables and a Utilities disc incl. 2 games, plus

Gemini's OFFICE MATE & OFFICE MASTER packages on Disc consisting of: Database, Spreadsheet, Beebplot graphics. Accounts packs: Cashbook, Final Accounts, Mailist, Easyledger, Invoice & Statements, Stock Control.

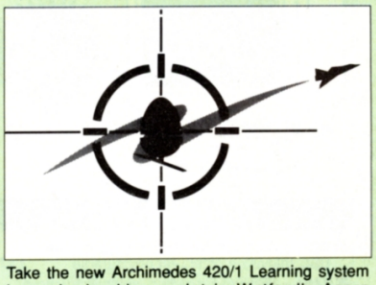
FREE with every BBC Master purchased from us during October

ADD-ONs & ACCESSORIES

Turbo 65C102 Add-on Module			£115
Econet Module for the Master			£47
Twin ROM Cartridge for Master			£9
Quad ROM Cartridge for Master			£14
Master Reference Manual I		(No VAT)	£14
Master Reference Manual II		(No VAT)	£14
Master Advance Ref Manual		(No VAT)	£17
64K Upgrade Kit for B+			£32
Acorn 1772 DFS Kit complete			£49
ECONET Upgrade Kit for BBC B			£42
ALL ECONET UPGRADES Available			
ARIES' IEEE Interface for BBC B & Master			£238
Morley Teletext Adaptor with ATS Rom			£99
Filestore E01S	£899	Filestore E40s	£749
Filestore E60S	£949	Ecolink	£270

(Carr. £2 to £7 depending on the weight)

Take the Acorn Archimedes Test Flight and win yourself a Supersonic Concorder Flight



Take the new Archimedes 420/1 Learning system home by booking a slot in Watford's Acorn approved Test Schedule. Call in at our showroom and check it out for yourself – Leave a deposit and you may borrow one of our specially chosen Learning Curve System for up to 14 days. Be satisfied before you buy. Return the system in good order for a complete refund. At the same time you may enter our FREE aviator competition. You could win stunning prizes; Fly in First Class Luxury in Concorder; Learn to fly a helicopter' Take a weekend of flying lessons; and many more prizes. So why not take a test fly at Watford.

For Archimedes Mk II Hand Scanner, Real Time Digitiser, Graphics Tablet, Software & Books, see pages 5, 8, 10 & 12 of our advert.

Z88 Portable Micro

Only: **£195** (Carr £4)

FREE

With every Z88 purchased from us, we are giving away absolutely FREE, a Z88 to BBC Interface Link, 4 rechargeable batteries and a compact Mains Battery Charger worth £38.

ACCESSORIES

● 32K RAM Pack or 32K EPROM Pack			£18.00
● 128K RAM Pack or 128K EPROM Pack			£45
● 512K RAM Pack			£175
● Z88 Eprom Eraser Unit			£35
● Z88 Spellmaster for Pipedream			£51
● Z88 Carrying Case			£9
● Z88 Computing Book			£9.95
● AA Nicad Rechargeable Battery			£1.50
● Battery Charger Compact & Fast			£6
● Z88 Serial Printer Cable			£9
● Z88 Parallel Printer Cable			£25
● Z88 to Archi Link			£15
● Z88 to BBC Link	£20	● Z BASE	£56
● Z88 to PC Link II	£30	● Z TAPE	£42
● Z88 to Macintosh	£52	● Z TERM	£42
● Z88 Mains Adaptor	£9	● Z88 Modem	£149

VISA

CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383

Continued→ → → → → → → → →

Monitors

12 months FREE maintenance on site

Microvitec 14"

- **1431** – Standard resolution as used on the BBC television computer programme **£175**
- **1451** – Medium resolution, suitable for word processing in mode 0 **£219**
- Cub3000 Medium Res for A3000 **£195**
- **1455** – MS Medium resolution, ideal for Archimedes **£220**
- **1441** – High res, exceeds the capabilities of the BBC Micro **£359**
- **1451AP** RGB + PAL and AUDIO **£255**
- **2040 CS** 20" Hi Res **£675**
- Dust Cover for Microvitecs **£5.50**
- **Touchtec 501 Touch Screen** **£239**

14" Multiscan Colour

- **TAXAN** 775 Plus – 0.28 Dot pitch Ultra high resolution, anti-static screen scanning Ultra High Res **£429**
- **TAXAN** 770LR Low Radiation Multiscan **£425**
- **PANASONIC** – 14" Super High Res. 0.29" Dot pitch, non glare screen. Built-in Swivel base **Launch price £349**
- **EIZO** 9060SZ Low Radiation, Super High Resolution, Antistatic screen, multiscan monitor for a wide range of applications. 800 dots x 600 lines. Display for high res VGA. 0.28 Dot pitch **£409**
- **EIZO** 9070S 16" Low Radiation .28 Dot pitch. As used on Archi 540/1 **£625**

Philips

- **BM7502** 12" Hi-res Green Monitor **£70**
- **CM8833** 14" Med. Res Colour Monitor **£215**

STAR BUY

- **PHILIPS 14"** Medium Res, dark glass, attractively finished Colour Monitor . A push-button switch toggles between Hi-Res monochrome green text mode and full colour display. (Please state the type of Connecting Lead you require).

ONLY £189

Dust Cover for Philips Monitors **£6**
(Securicor carriage on Monitors £7)

Swivel Bases

By simply placing your monitor on one of our front adjustable professional swivel bases (see drawing at the top), you can easily adjust the viewing angle.

for 12" Monitors **£8** (carr. £2.50)

for 14" Monitors **£12** (carr. £2.50)

Anti Glare VDU Screen

These extremely effective, easy to install, 12" & 14" VDU screens eliminate harmful glare, improves contrast on colour monitors. Increases productivity in offices. A must for wordprocessor users.

£12

Spare Monitor Leads

BNC Lead for Zenith or Philips	**£3**
Skart Monitor Lead	**£5**
RGB lead for TAXAN Monitors	**£3**
Archimedes Colour Monitor Lead	**£7.50**

FREE On-Site Maintenance

This month we are also offering at no extra cost to all our customers, 12 months, On-Site Maintenance on all Microvitec and Multiscan colour monitors; all Panasonic, Hewlett Packard, Roland Plotters and Laser Printers; and of course the full range of Archimedes micros. Should the machine fail, simply telephone the maintenance engineer, who will call in within 12 working hours. (Offer applicable only when bought at prices advertised in this advert).

Concept Keyboards

Standard A3 Keyboard with BBC Software	**£143**
Standard A4 Keyboard with BBC Software	**£117**
Archi A3 Keyboard	**£144**
Archi A4 Keyboard	**£118**

Roland Plotters

(Official Roland Appointed Distributor)

- **DPX 2500** **£2435**
- **DXY 1100** **£545**
- **DXY 1200** **£715**
- **DXY 1300** **£925**

Panasonic Printers

12 MONTHS FREE MAINTENANCE ON SITE

- **KX-P1081** 9pin 80col. 144/28 cps **£124**
- **KX-P1180** 9pin 80col. 192/38 cps **£134**

FREE with every KX-P1081 & KX-P1180:
A printer lead (please specify type required) and a Dump Out 3 ROM for the BBC Micro or 1,000 sheets of fanfold paper for other micros, please specify)

Various Panasonic Printers

- **KX-P1124** 24pin 80col. 192/63 CPS **£185**
- **KX-P1540** 24pin 136col. 240/80 CPS **£390**
- **KX-P1592** 9pin 136col. 216/45 CPS **£275**
- **KX-P1595** 9pin 136col. 288/61 CPS **£345**
- **KX-P1624** 24pin 132col. 192/63 CPS **£318**
- **KX-P1695** 9pin 132col. 330/86 CPS **£320**
- **KX-P1123** 24pin 80col. 192/63 CPS **£199**

Panasonic Accessories

Cut Sheet Feeders

KX-P1592/1595 (P32)	**£175**	KX-P1540 (P35)	**£175**
KX-P1124 (P36)	**£85**	KX-P1180 (P37)	**£79**

Buffers

P12	4K buffer Board for 1081	**£55**
P42	32K buffer Chip for 1592/1595	**£16**
P43	32K Buffer Chip for 1540/1124/1180	**£16**

Serial Interfaces

P17	P1081/1592	**£32**	**P19** P1124/1180	**£55**

Original Panasonic Ribbons

Guaranteed to last 3 million characters

P110	for KX-P1081, 1592 & 1595	**£8**
P115	for KX-P1180	**£8**
P145	for KX-P1124	**£8**
P140	for KX-P1540	**£10**

Colour Ribbons for KX-P1081, 1592 & 1595
Brown, Blue or Red **£9.95 each**

Integrex Colour Jet

- Colour Jet 132 Printer **£515**
- Paper Roll **£6.50**
- Screen Dump Software **£10**
- Colour Cartridge **£19.50**
- Colour Textile Cartridge **£29**
- Black Cartridge **£11.25**
- Black Textile Cartridge **£17**
- 100 A4 OHP transparencies **£55**
- 8K Serial Interface Optional **£123**

Canon Printer

Canon Bubble jet BJ 130E **£435**

Citizen Printer

120D Plus	**£105**	Swift 9	**£198**
Prodot 9	**£275**	Prodot 24	**£275**
Swift 24	**£238**		
Swift 24 Colour Option			**£34**
Swift 24 Colour Ribbons			**£13**

Hewlett-Packard Printers

- HP Desk Jet + **£339**
- HP Paint Jet Col. **£676**
- HP Thinkjet **£250**
- HP Quiet Jet Plus **£415**
- HP Scan Jet + **£1199**
- HP Desk Jet Cart. **£15**
- HP Desk Writer **£620**
- Desk Jet 500 **£379**

Star Printers

- **LC10** 9pin 80col. 144/36 CPS **£119**
- **LC10** Colour 9pin 80col. 144/36 CPS **£158**
- **LC10-II** 9pin 80col. 180/45 CPS **£145**
- **LC15** 9pin 136col. 180/45 CPS **£250**
- **LC24-10** 24pin 80col. 180/60 CPS **£185**
- **LC24-15** 24pin 136col. 200/67 CPS **£315**
- **XB24-10** 24pin 80col. 240/80 CPS **£379**
- **XB24-15** 24pin 80col. 240/80 CPS **£489**
- **XB-24** Colour Kit **£35**
- **LC-200** Colour 9pin 80col. 180/45 CPS **£185**
- **LC-24-200** 24pin 80col. 222/67 CPS **£229**
- **LC24-200** Colour 24pin 80col. 222/67 CPS **£265**

Star Accessories

Cut Sheet Feeder

LC10/LC24-10	**£65**	LC15/LC24-15	**£125**
XB24-10	**£80**	XB24-15	**£139**
LC24-200	**£63**		

Serial Interfaces

SPC-10	LC10; LC10-II; LC10-Col; LC15; LC24-10; LC24-15; LC-200; LC24-200	**£49**
8K Ser	LC-200; LC24-200; FR10; FR15; XB24-10; XB24-15	**£64**

Paper Roll Holders

LC-200; LC24-200; LC24-200 colour **£29**

Buffers

32K Ram Card for LC24-10; 15 & 200	**£55**
32K Ram Card for XB24-10 & 15	**£55**

Ribbons

LC10; LC10-II; LC15	Black **£4**
LC10; LC10-II; LC15	Colour **£6**
LC-200; LC24-200	Black **£5**
LC-200	Colour **£11**
LC24-200	Colour **£12**
XB24-10; XB24-15	Black **£5**
XB24-10; XB24-15	Colour **£12**

Laser Printers

Canon LBP-4	4ppm	**£825**
Canon LBP-8 III	8ppm	**£1299**
Epson GQ500	6ppm	**£835**
HP Laserjet IIP**	4ppm	**£725**
HP Laserjet IID	8ppm	**£1820**
HP Laserjet III	8ppm	**£1199**
HP Laserjet IIID		**£1875**
Panasonic KX-P4420	8ppm	**£785**
Panasonic KX-P4450i	11ppm	**£1185**
Panasonic KX-4455 Postscript	11ppm	**£1799**
Qume Crystal Print WP+		**£749**
Qume Crystal Print Ser. 2		**£1065**
Qume Crystal Print Publisher 2		**£1899**
Star LP-8 II		**£1099**
Star LP-8 Star(post)script		**£1575**

** Lower Paper Cassette Tray & Premier Collection Software, FREE with every HP Laserjet IIP printer purchased from us. Offer subject to availability.

Laser Toners

Canon 2	**£59**	Laserjet II	**£65**
Canon 4	**£60**	Laserjet IIP	**£60**
Epson GQ	**£18**	Panasonic	**£25**
Star	**£59**	Qume Crystal	**£63**

Laser RAM Upgrades

HP Laserjet II RAM		GQ5000 512k	**£99**
Jetware II 1MB	**£175**	KX-P4420	1M **£249**
Jetware II 2MB	**£330**	KX-P4450i	1M **£299**
Jetware IIP 1MB	**£199**	KX-P4450i	2M **£575**
Jetware IIP 2MB	**£319**		

Epson Printers

EX800	£410	LQ1050	£540
EX1000	£540	LQ1060	£649
FX850	£299	LQ2550+	£760
FX1050	£370	LX400	£120
FX1060	£679	LX850	£179
LQ400	£182	SQ850	£515
LQ550	£269	SQ2550	£789
LQ850	£439	TLQ4800	£1449
LQ860 Colour	£535		

Cut Sheet Feeders for

EX800/FX800/850/LQ800/850	£130
FX1000/LQ1000/1050	£175
LQ2550	£390
LX400/800/850/LQ400/500/550	£69

Tractor Feed for

LQ800 **£44;** LQ850/FX850 **£69;** LQ1050/FX1050 **£85;** LQ2500 **£90;** LQ2550 **£90.**

Accessories

- EX800/1000 Colour Option **£45**
- EX800/1000 Colour Ribbon **£14**
- LQ2500 Colour Option **£65**
- Multifont Card for LQ550/850/1050 **£95**

Epson Printer Interfaces

All these interfaces fit inside the printer

RS232	£32	RS232 + 2K Buffer	£52
IEEE 488	£40	RS232 + 8K Buffer	£79

Printer Leads

BBC Centronics 4' long	£5
BBC Centronics 6' extra long	£7
Compact's Special Centronics Lead	£7
Archimedes Printer Lead 6'	£6
Nimbus Centronics Lead	£6
IBM/Archimedes Parallel Lead 6'	£6
IBM/Archimedes Parallel Lead 5 metres	£13
IBM/Archimedes Parallel Lead 10 metres	£19
Double Ended 36 way Centronics Lead 4'	£7
Double Ended 36 way Centronics Lead 6'	£9
MSX Centronics Parallel Lead 4'	£12
RS232 Leads (Various)	P.O.A.
IBM Keyboard extension lead coiled	£5

Important Notice to All our Customers

Watford Electronics only supplies products fitted with British Specification 240V AC Mains 3 core cable with connections for Live, Neutral and Earth. We do not sell, nor intend to supply grey imports from Europe with incorrect 220V European mains connections (2 core cable!) which could be dangerous to the end user.

Megabuffer 256

The Smallest 256K Printer Buffer Unit in the world **38mm x 130mm x 134mm.**

This new Megabuffer 256 from Watford is a full featured 256K Printer Buffer. The features are:

- Improves efficiency by making more efficient use of computer and printer.
- Compatible with any computer and printer that uses Centronics Parallel connections including all BBCs, IBM PCs, etc.
- Total compatiblity with all software.
- Cheaper phone bills when using your Modems.
- Ideal for those doing large graphics screen dumps that are slow to print.
- Multi-Copy facility allows you to print several copies via Megabuffer without going through your computer.
- Data Dump facility is included.
- Built in text unit for both the buffer & your printer.

Only £119 (carr £5)

Universal Printer Sharers/Changer

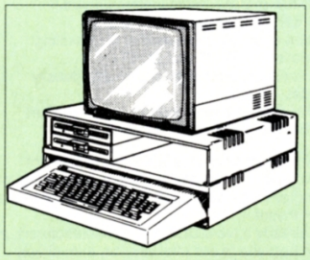
Connect upto 5 Micros to 1 printer or 5 Printers to 1 Micro with our combined, Sharer/Changer. These Units are made to a very high standard. For extreme reliability, they all have Printed Circuit Boards mounted inside the case, (not a Spaghetti Junction of wires). Internal connection is made via high quality ribbon cables.

(Ideal for School environments)

Connects	Serial	Centronics	P&P
2 to 1	£16	£17	£3
3 to 1	£22	£24	£3
5 to 1	£–	£32	£4

(Cables extra at £6 each. Please specify type required when ordering)

Plinths for BBC Micro, Master & Printer



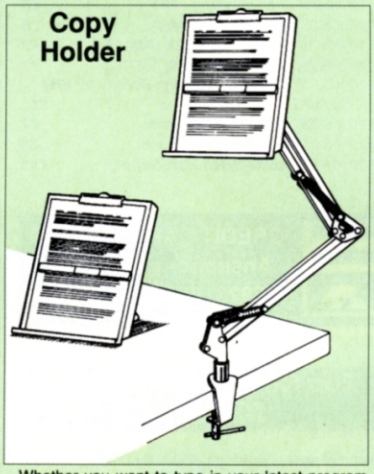
Protect your computer from the heat of your VDU. Our micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and VDU, whilst the double height version provides enough room for our stacked disc drive and other peripherals like, Eprom programmer, music unit or simply discs & stationary. The computer slides neatly in the lower section allowing easy access to remove the lid.

The single printer stand is equally sturdy but instead of cooling slots it has elegant cutouts on the sides. This allows easy access to paper from all sides. Colour: BBC Beige.

Single BBC Plinth	420 x 310 x 105mm **£13**
Double BBC Plinth	420 x 310 x 210mm **£24**
Printer Plinth	420 x 310 x 105mm **£12**
Single Master Plinth	490 x 310 x 105mm **£14**
Double Master Plinth	490 x 310 x 210mm **£26**

(Carr. Single plinth £2; double plinth £3)

Copy Holder



Whether you want to type in your latest program or the draft of a new trilogy, Watford's manuscript holders are superb for holding your paper at the ideal height and angle to allow you to read and type in ease and comfort.

Available in 2 full A4 versions, desk resting and shelf clamping. Paper is held firmly by means of a plastic retaining ruler and a clip grip. (for resting books or magazines, the desk top version is recommended).

Desk Top **£7** (carr. £3)

Angle poise **£12** (carr. £3)

Listing Paper (Perforated)

- 1,000 Sheets 9.5" x 11" Fanfold Paper **£7**
- 2,000 Sheets 9.5" x 11" Fanfold Paper **£11**
- 1,000 Sheets 9.5" x 11" NCR 2 Part Fanfold **£21**
- 1,000 Sheets 15" x 11" Fanfold Paper **£9**
- 1,000 Sheets true A4 Fanfold Paper 70gms **£11**
- 2,000 Sheets true A4 Fanfold Paper 70gms **£21**
- Teleprinter Roll (Econo paper) **£4**

(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).

Carriage 1K Sheets £2.50, 2K Sheets £3.00

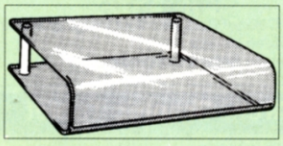
Printer Labels

(On continuous fanfold backing sheet)

1,000 90 x 36mm (Single Row)	£5.00
1,000 90 x 36mm (Twin Row)	£4.90
1,000 90 x 49mm (Twin Row)	£7.50
1,000 102 x 36mm (Twin Row)	£6.25

Carriage on 1,000 Labels £1.00

Perspex Printer Stand

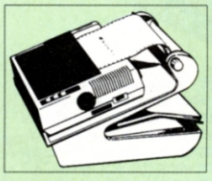


Give your Computer System a touch of Class with our elegant, smoke finished Perspex Printer stand.

80 Column version **£16** (carr £3)

136 Column version **£20** (carr £4)

Professional Printer Stand



The professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Its ergon-omic design ensures smooth paper flow and automatic refolding.

80 Column version £23 (carr. £3)

132 Column version £28 (carr. £4)

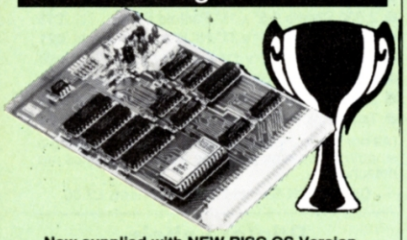
Printer Ribbons & Various Dust Covers

Type	Ribbons	Dust Covers
Brother HR15/20	£3.50	–
BBC Micro	–	£3.50
BBC Master	–	£4.00
Archimedes Micro pair	–	£9.00
Citizen 120D	£2.75	£4.50
DMP2000	£2.75	£4.75
EX/LQ800	£3.50	£4.50
EX/LQ1000	£3.50	£5.00
RX/FX80/85/800/MX80	£2.95	–
FX/MX/RX100/1000	£3.95	–
Kaga/Taxan KP810/815	£3.25	£5.00
LQ500/550/800/850	£3.25	£6.00
LQ1050/LQ2500	£4.00	–
LX80/86/800/850	£2.75	£4.50
M1009/GLP	£2.95	£3.75
NEC P2200	£4.50	£5.00
Panasonic KX1080/81	£3.25	£4.75
Panasonic KX-1124	£7.50	£5.00
SQ2500	£23.00	£5.50
Star LC10/NL10	£2.75	£5.00
Star LC24-10	£2.95	£6.00
Olivetti Ink Jet Cartridges (set of 4)	£9	

Our attractive Dust Covers are manufactured from translucent PCV. The seams are stitched and edges are taped to prevent splitting due to continuous use.

Continued→ → → → → → → → →

Archimedes Real-Time Digitiser



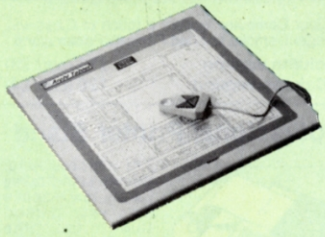
Now supplied with NEW RISC OS Version Software

Watfords' Archimedes Video Digitiser is the most sophisticated digitiser ever designed for a micro. It provides a fast and flexible means of capturing images from a video camera or recorder for display and manipulation on the Archimedes range of Micros. Off-air televison signals may also be digitised via a video recorder or TV tuner. Please write for further details.

Price £175

A Set of Colour Filters for colour image grabbing using a video camera **£16**
New Risc-OS Software Upgrade **£39**

Archi Graphic Tablet



The Archi Graphic Tablet offers performance and accuracy comparable to other tablets priced at well over £400, and has the useful addition of a liftable cover, which can hold tracing material or menu templates securely. The package is supplied complete with sophisticated Archi software. (Now, fully LinCAD compatible. Recommended by Linear Graphic).
(FREE this month, PC Mouse Drivers & Art package)
(Now, fully LinCAD compatible. Recommended by Linear Graphic).
(FREE this month, PC Mouse Drivers & Art package)

Special Price £225

(Price includes Tablet, Leads, Software & Puck)
Stylus Optional Extra **£29**

Disc Plonker Rack

When using ones micro, there is a tendency to have more than one Disc on the desk. This exposes them to the harzards of fingerprints, scratches, dust, coffee and an untidy desk. Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. Holds up to eight 5.25" discs.

Protection at Only: **£2**

Acorn & Watford DFSs

- Watford sophisticated DFS ROM **£16.00**
- Watford DFS Kit complete **£69.00**
- We will exchange your existing ROM for Watford's ultimate DFS ROM at only **£12.00**
- DFS Manual (comprehensive) **£6.95**
- Acorn DNFS ROM **£17.00**
- Acorn ADFS ROM only **£25.00**
- Acorn 1772 DFS ROM Kit **£49.00**

(The single Density DFS system is now old technology. Like Acorn, Watford too have decided to replace it with the their more up-to-date 1770 DDFS interface. We have informed most of the software houses of this decision in order that they can ensure compatibility with our highly sophisticated and fully Acorn compatible DDFS).

Watford's MkII 1772

Single/Double Density DFS

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our Mk II DDFS Board with its 1770 Disc Controller, has been adapted to allow the use of Acorn ADFS as well. It also has all the commands of the Acorn's 1770 DFS, plus the added features.

Added features include:

- Acorn ADFS compatible – Use ADFS on our DDFS board.
- Tube host Code – No longer any need to have the DNFS in your machine to use Co-Processors, even the CoPro and Master 512.
- Auto 40-80 Track sensing – no need to fuss with 40/80 track switches (even works with protected disks).
- An extremely powerful 8271 emulation – ensuring compatibility with almost all software.
- New low profile – small footprint board.
- Fits with all third party ROM boards.
- Option to double the speed of file handling operations – BPUT and BGET.
- Operates in both single and double density modes.
- OSGBPB has been recoded, increasing still further the speed of file handling.

Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the disk – Ours allows both of these!
If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only **£39.00.**

- SPECIAL PRICE **£44.00**
- DDFS Manual (No VAT) **£6.95**
- We will exchange your existing DFS Kit for our sophisticated DDFS for only **£30.00**

Please note, as the MkII DDFS is a hardware and sofware upgrade, it is not possible for existing Watford DDFS users to simply exchange the ROM for the new version.

3M – Diskettes

3M – SCOTCH Diskettes with Lifetime warranty from Watford Electonics your 3M Appointed Distributor

- *10 x 5.25" S/S D/D 40T (744)* **£5**
- *10 x 5.25" D/S D/D 40T (745)* **£5**
- *10 x 5.25" S/S D/D 80 Track (746)* **£7**
- *10 x 5.25" D/S D/D 80 Track (747)* **£7**
- *10 x 5.25" 1.6M D/S D/D High Density for IBM XT and AT* **£11**
- *10 x 3.25" S/S D/D 40/80 Track* **£7**
- *10 x 3.25" D/S D/D 40/80 Track* **£8**
- *10 x 3.5" Double Sided High Density* **£15**

VISA Access

CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383

Top Quality 3.5" & 5.25" Diskettes

To complement our range of Quality Discs and Disc Drives. WE are now supplying SPECIAL OFFER packs of 10 Lifetime guaranteed discs. Each disc has a reinforced hub ring. Supplied complete with selfstick labels and a Plastic Library Disc Box.

- *10 x **M3** 3.5" D/S D/D 80 Track* **£7**
- *10 x **M9** 3.5" D/S High Density* **£14**
- *10 x **M4** 5.25" S/S D/D 40 Track* **£5**
- *10 x **M5** 5.25" D/S D/D 40 Track* **£5**
- *10 x **M7** 5.25" D/S D/D 80 Track* **£7**
- *10 x **M8** 5.25" D/S H/D Hi-Density* **£11**
- ***M2** 3" Double Sided* **£2.50** *each*

Floppy Head Cleaner Kit

The heads in floppy drives are precision made and very sensitive to dirt. The use of cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. it is very simple to use. Available in 3.5" & 5.25", please specify.

Price £4

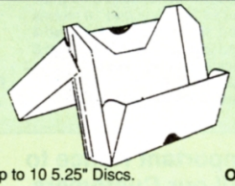
Antistatic Lockable Disc Storage Units

Gives double protection – Strong plastic case that affords real protection to your discs.
Antistatic helps avoid data corruption whilst in storage. The smoked top locks down.
Dividers and adhesive title strips are supplied for efficient filing of discs.

- **M35** – holds up to 50 5.25" discs **£4.95**
- **M85** – holds up to 95 5.25" discs **£6.95**
- **M25*** – holds up to 25 3.5" discs **£4.95**
- **M50** – holds 50 3.5" discs **£6.50**
- **M10** – holds 8 of No. 10 Data Cartridges **£15**

* Not lockable

Plastic Library Cases



Holds up to 10 5.25" Discs. **Only £2.00**

Dust Covers (For our Disc Drives)

Single CLS (without PSU)	**£3.20**
Single CS (with PSU)	**£3.25**
Twin CLD (without PSU)	**£3.85**
Twin CD (with PSU)	**£3.90**

Disc Albums

Attractively finished in black leather-look vinyl. Stores up to 20 discs. Each disc can be seen through the clear view pocket.

£4

Special Bulk Offer on Discs

(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)

PRICES SLASHED

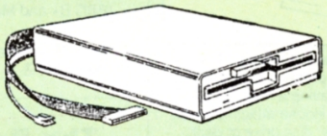
BULK PACK DISCS in lots of 100

Type	S-S 40T	D-S 40T	D-S 80T
Without Sleeves 5.25"	£30	£35	£40
With Sleeves 5.25"	£33	£38	£43
3.5" D/S D/D	£22 for 50		£40 for 100

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.
The tinting of the boxes indicates 40/80 track switchable disc drives. For ease of use, the switches are mounted on the front panel.
All our Disc Drives are Double Sided and will operate in both Single and Double Density modes. *Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*
Various UK "manufacturers" of disc drives for the BBC micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high qulity NEC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public. If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.
Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. ***Ideal for Schools & Colleges.***
When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space) your BBC Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with a Watford plinth. (Turn to the 4th page of our advert for the Plinths).
P.S. All our 5.25" Disc Drives with PSU are compatible with the Compact Micro. All you require is the special Compact Disc Drive Cables designed by us.

Our Disc Drives conform to BS415



"Test Bureau Approved for Use in Education"

Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
400K (720K)	CLS400S £74		CS 400S £83	
800K (1,44M		CLD 800S £149		CD 800S £162

● TWIN Disc Drive Case, complete with Power Supply & Cables **£43**
Securicor carriage on Disc Drives £6 to £7

Prefix ***C*** *= Cased Drive*
L *= Less PSU*
S *= Single*
D *= Double*

Suffix ***S*** *= 40-80 Switchable*

e.g. CLS400S = Cased Disc Drive, Less power supply unit, single 5.25" 400K, (720K in double density); Double sided; 40/80 track switchable.

Refurbished Disc Drives now available
CLS400 £50; CLD800 £98; CS400 £59; CD800 £115

Special Cable to connect both 3.5" and 5.25" Disc Drives simultaneously to the BBC Compact £13

Special 40/80 Disc Drive/DDFS Mk II Offer

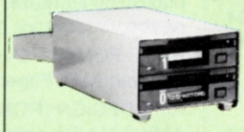
● The popular 40/80 track 400K single Disc Drive, Double Sided, cased with Cables. Plugs directly to your Micro.

● Watford's extremely popular DDFS Disc Interface (allows 720K storage). Will run in both Single & Double Density modes.

● A comprehensive User Friendly Manual.

A Bargain at Only **£119** (£7 carr) (Offer valid while stocks last)

3.5" DISC DRIVE OFFER



These top quality 3.5" Double sided, 80 track, 1 Megabyte (unformatted each Disc Drives), are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc.

Drives to connect to BBC Micros own PSU

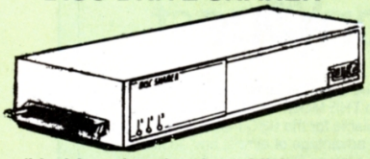
● **CLS35 400K Unit £65** ● **CLD35 Twin 800K £119**

Drives with built-in Power Supply Unit

● **CS35 Single 400K £85** ● **CD35 Twin 800K £129**

(P.S. CS35 Single is supplied in a twin case with a blanking plate to enable easy expansion to a dual drive at a later stage).

DISC DRIVE SHARER

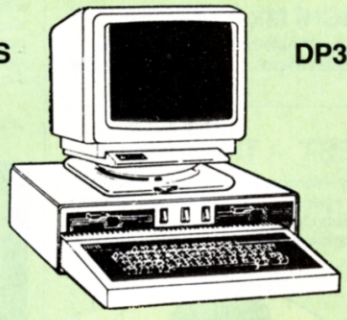


(Ideal for educational establishments)

At last, a low cost alternative to the Econet system.Watford's Intelligent Disc Drive Sharer allows you to connect 3 BBC micros (model B, B+ and Master series) to a single or double disc drive. Running under any DFS or DDFS, this intelligent unit will automatically queue the computers. Each computer has a status light dedicated to it. If it is green you will get immediate access to the disk, and red means that you are next in line. The unit plugs directly into the disc drive socket on each computer and is powered by the mains. (N.B. Not for use with ADFS.)

Offer Price : **£55** Price includes 3 Cables

CDPM 800S **DP35-800S**



Twin 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The mains switch with neon On/Off light indicator, and the two 40/80 track switches are mounted on the front panel for ease of use.

CDPM 800S for the BBC B & Master £175

A Double disc drive with a difference! Times are changing fast for the floppy disk, and whilst the current standard for the BBC B and Master series is the 5.25" disk, the standard of the future will most certainly be the smaller; faster and more reliable 3.5 inch disks – now a standard feature of both the Master Compact and the Archimedes Series.

To support the present disc drive users, and cope with the future, we have designed our own plinth-mounted disk system – called the DP35 800S. It contains both the 5.25 inch and the 3.5 inch drive formats as well as offer a firm and rigid support for a monitor on top. With the BBC Micro underneath, the plinth makes a surprisingly small footprint on the desk – leaving you more space to work with.

The 5.25" disc drive is 40/80 track switchable. DP35-800S has its own power supply, independent of the BBC Micro.

DP35-800S for BBC/Master £165

(Securicor Carr. £7)

(The above drive units are 2 Megabytes unformatted)

Continued→ → → → → → → → →

QUEST MOUSE Mk II

- Quest Mouse II & Quest Paint **£58**
- Quest Mouse II, Quest Paint, AMX Stop Press & Pagefont **£89**
- Quest Mouse II only **£29**
- Quest Paint Software only **£34**
- Quest Font Disc (22 Text Fonts) **£15**
- Quest Mouse Mat (Red or Blue or Green please specify) **£3**
- Part Exchange your unreliable AMX Mouse for a Quest Mouse for only **£22**
  (P.S. Quest Paint is not compatible with BBC Compact)

Quest Paint is the winner of the BBC Acorn User 1990 Award for the Best Art/Graphics software

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ConQuest

Quest combined with ConQuest and Acornsoft GXR ROM make up THE MOST POWERFUL drawing packages available for the BBC range. Quest Paint is able to take advantage of almost any additions to your machine, such as Shadow or Sideways RAM. ConQuest takes this principal even further, by utilising the otherwise normally incompatible Sideways RAM facility by holding pictures in them.

ConQuest ROM Package **£30**
(Price includes software in ROM and a comprehensive Manual).
(Not Compatible with BBC Compact)

ARCHI Mk II MOUSE

An extremely reliable replacement mouse for Archimedes Micro **£39**

QUEST – Tracer ball

An attractively finished, extremely reliable, mouse replacement, input device. Requires very little desk space. Connects directly to your BBC B, BBC Master or Archimedes Micro.

QT-10 BBC/Master Version **£32**
QT-20 Archimedes Version **£35**

RB2 Marconi TRACKER BALL

RB2 (AMX/Quest compatible)	£45
RB2 including Quest Paint	£75
RB2-A for Archimedes	£46

THE NEW Mk III AMX MOUSE

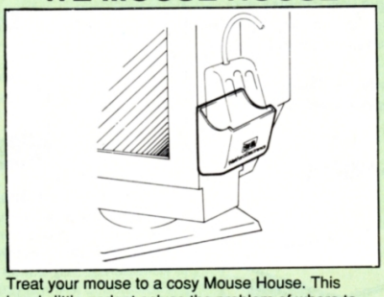
Inc. Super Art package

ONLY: £59 (carr £3)

(Please specify for BBC, Master or Compact)

MOUSE MAT	£3
AMX MOUSE ONLY	£29
AMX SUPERART Package	£34
AMX STOP PRESS – A Desktop publishing software. Works with Keyboard, Joystick or a mouse	£32
PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker	£13
AMX DESIGN (ROM)	£55
AMX XAM Educational	£15
AMX EXTRA EXTRA	£16
AMX MAX A gem of desktop (ROM)	£20

WE MOUSE HOUSE



Treat your mouse to a cosy Mouse House. This handy little gadget solves the problem of where to store your mouse when it is having a rest. Made of sturdy plastic, the WE Mouse House attaches to the side of your computer, monitor, disc drive or desk. It protects it from damage when not in use, yet within easy reach when you need it again. There is also a second compartment for your pens and pencils – and at £4 it doesn't cost a rodent's ransom.

Price £4

Our Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted. (Price includes FREE software Disc and Operating Manual)

Only £21

FLEET STREET EDITOR

Software pack for BBC Micro	£33
Software pack for the Master	£39
Admin Xtra Disc Utility	£13
Fonts N Graphics Disc Utility	£13

BEEB VIDEO DIGITISER

"Test Bureau Approved for Use in Education"

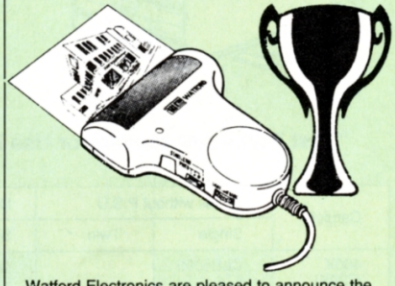
Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.
This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket. The software supplied includes a sophisticated, fast screen dump routine.
Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem. The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

£109 (Carr. £5)

(BBC B+ and Master compatible, except Master with Econet)

(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)

The Beeb HandScan
Hand-held Scanner for the BBC Micro



Watford Electronics are pleased to announce the launch of the first hand held scanner for the BBC Micro. HandScan is a compact unit which will allow photographs, diagrams, or any other documents to be digitised quickly and easily, to then be used in a desk top publishing package, art program, or even in your own Basic programs! These useful devices have been available for faster and more expensive micros for some time, but only now is Watford Electronics able to offer the BBC Micro computer.

The HandScan plugs directly into the 1MHz bus on the BBC while a comprehensive set of utilities provided by the sophisticated ROM firmware. The scanner has a resolution of either 100 DPI or 200 DPI when accuracy is essential. Pictures as wide as 4" may be scanned in mode 0 and various types of dithering may be selected to simulate the grey levels of a scanned picture.

All necessary software has been included in the firmware to allow the scanner to read images directly into our Wapping Editor with little more than the click of the mouse. The digitised picture may then be incorporated into your magazine, newsletter, report or any other document.

Beeb HandScan & Firmware **£135**

Winner of the BBC Acorn User 1990 Award for the Best DTP/Word Processor

The Wapping Editor

The Wapping Editor from Watford Electronics represents a breakthrough in Desktop Publishing for the Beeb. The package includes a 64K ROM containing ALL the software needed to get into print fast; a very sophisticated graphics module, professional quality typesetting software, a word processor, a comprehensive font editor for designing your own typefaces, and a variety of printer dumps. This mouse-driven system is designed for the BBC B, the B+ and Master computers and will take full advantage of any Sideways and Shadow RAM that may be fitted. It will run under DFS, ADFS and Network filing systems and requires as a minimum just a single 40 track drive.

Included with the system is a utility disc containing several high quality fonts, various utilities and a ROM image of a Support ROM. A comprehensive 100 page manual completes the package. The Support ROM contains routines to allow an area to be rotated to any angle or distorted to any four-sided shape. Also included are facilities to draw ellipses at any angle and sectors, segments and arcs (in Master or BBC B with Acorn GXR). Another of the features of the Support ROM is a 'Turbo DFS' which gives DFS access times comparable with those of ADFS.

Page Layout Section

The Wapping Editor may be used to create pages of any size from an A6 to a full A3 page. If none of the eight default page types suit your purpose, the stand-alone page creation program may be used to create pages to your own requirements. By using proportionally spaced fonts and genuine microspacing it is possible to print over 150 characters across an A4 page. A unique feature of the Wapping Editor is the 'A5 x 2' page size allowing two A5 pages to be printed side by side onto a single A4 sheet.

The graphics module incorporates the facilities like: pencil, brush, airbrush, polygon, circle, eclipse, fill, cut & paste, etc.

Text may be typeset, either justified or unjustified, in any font anywhere on the page. Simply select which font and text document you wish to use, and pull out a rectangle on the page where you want the text to be – it's as simple as that! Multiple columns may be printed just as easily and a special 'expand' feature may be used to expand the microspacing so that the document exactly fits the space defined.

Word-Processor

The integral word processor is the ideal tool for producing your text documents, although text can of course be read in from any of the other popular word processors such as View, Wordwise etc.

The Font Editor

The font editor module will allow you to design your own typefaces or to modify the ones provided on the utility disc. This sophisticated editor has numerous functions designed to take the tedium and frustration out of producing good looking, well balanced fonts. Each character may be individually proportionally spaced and characters of any size up to 16 x 16 pixels may be defined.

Pictures may also be 'grabbed' from a video source by using the Watford BEEB Video Digitiser.

Wapping Editor Software Pack £69
Wapping Editor plus Mouse £89

(Wapping Editor only works with Master Compact if a Mertec Expansion box is fitted)

Wapping Art Disc

Over 250K of clip art to cut and paste into your Wapping Editor pages. Pictures include maps, transport, people, media, sport, games etc.
Two 'ratio' screens for use with hi-res and rotated A5 pages to ensure images are not distorted when printed out.

Music writing symbols in the form of pattern and brush for quick production of manuscripts are included together with staves.

There are two prepared hi-res pages layed out for printing labels, both single and double width. Ready made label designs are included but these can be easily replaced with your own designs.

A Mode 0 screen dump routine is also included. To pack such a large amount of data onto the discs the screens have been compressed and routines to compress and expand Mode 0 screens are included on both discs. Using the packing routine you can archive large numbers of screens onto a single disc.

£15

Wapping Font Disc 1

Sixteen Wapping Editor fonts including smaller versions of Oberon and Daisy and two new sizes of the standard font.
Also included are three Mode 0 screens containing giant 'headline' fonts to cut and paste to create extra smooth headlines.
Supplied complete with instructions.

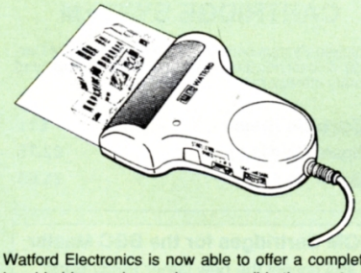
£12

Wapping Font Disc 2

This new addition to our Wapping range of DTP software provides you with additional 23 fonts.
On 80 track disc only

£13

Archi Mk II Hand Scanner



Watford Electronics is now able to offer a complete hand held scanning package, possibly the most essential addition to any desk top publishing system. The package includes the most comprehensive utility software available for the Archimedes, a high quality, ergonomically designed to fit the shape of your hand, (see drawing above) scanner, which is fitted with a warning LED that will indicate if the scanner is being moved too quickly for accurate results. Additional twin guide rollers ensure precise tracking over the image, to make the best use of the high resolution available with this system. The yellow/amber illumination of our Mk II scanner, enables you to achieve optimum accuracy. It is capable of scanning upto an amazing 400 DPI. The scanning area is 4" wide and the height is only limited by the maximu amount of memory available.

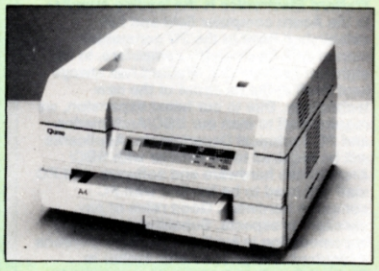
On board ROM software supplied, is the most sophisticated Archimedes scanner software yet written.

AHS-4 Archi 300/400 Version £149
AHS-3 Archi A3000 Version £175

VISA Access

CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383

Laser Direct



By using the power of the Archimedes RISC processor, it offers the best of both worlds – print speed up to 5 times faster than typical Laserjet compatibles – uses outline fonts so that any font can be scaled to any size – works with all programs that use RISC OS printer drivers. Ideal for use with Genesis, !Draw, Acorn DTP, Impression, etc. Includes 50 sheet paper tray and a single sheet/ envelope tray. Requires one expansion slot and at least a 2Mbyte Archimedes. A very compact printer, a very low initial cost and very low running costs.

Launch Offer: £849

(For demonstration, call in at our retail shop)

ArcLaser

ArcLaser uses the considerable power of the Archimedes to control the Laser printer directly via a very high speed interface software. This gives speed and economy. The Scaleable fonts facility enables every font to be scaled to any size at 400 dpi, and in portrait or landscape mode. Full Page Graphics produced in 20 to 60 seconds at 300 dpi typically.

Introductory Offer:£799

NEW

Beeb PC (BASIC)

Beeb PC Basic is designed for program authors wishing to convert programs so that they will run on IBM personal computers. To convert BBC BASIC programs manually can waste days of valuable time with every occurrence of common statements such as PROC, DEFPROC, TAB, having to be changed. Beeb PC (BASIC) automates many of these changes, and will convert majority of BBC statements that are invalid for IBM BASIC into equivalent acceptable statements. In addition BBC BASIC data files can be converted to IBM BASIC format, with support provided for all BBC data formats:- INTEGER, REAL & STRING.

Price: £38

Beeb DOS 2.2

The BBC and IBM PC's are the most popular micros in the UK. The BBC is firmly established in the education sector and the IBM is the industry standard in the business world. The pools of information and applications held on these computers are immense, yet the means of passing information between them are very limited. Beeb DOS provides a practical method of transferring information between these two micros.

Beeb DOS isia collection of utilities which run on the PC's and enable it to read and write information on BBC discs. You can transfer files between your PC's 360K floppy, high density floppy or hard disc and your BBC discs. In addition Beeb DOS allows you to catalogue, format and compact BBC discs and delete, re-name, lock and unlock BBC files, all on PC's. Each Beeb DOS utility is written in IBM assembler and is run directly from PC or MS-DOS. The Beeb DOS utility can be run from floppy disc, hard disc or RAM drive.

Beeb DOS is supplied on an IBM 5.25", 360K disc complete with a comprehensive operating manual.
(Will only work on 360K Disk Drives)

Price: £39

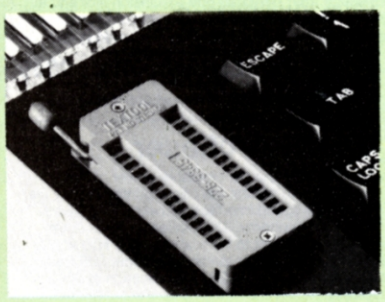
(Please write in for technical literature)

Continued→ → → → → → → → →

STAFF VACANCIES

Watford Electronics is the leading supplier in the Acorn computer field and has established itself in the PC compatible market with its Aries PC computers. In its eighteen year history, Watford has always kept itself at the forefront of the new technology. Due to our latest expansion, we require staff to man our BBC/Archimedes and PC Technical Departments. Applicants will be required to be familiar with BBC/ Archimedes hardware and software, and PC staff will need to be familiar with PC computer hardware. Good rates of pay, excellent prospects. Subsidised company accomodation is available to single persons if required. Telephone Keith Archer or Richard Overfield for interview, or write to us enclosing your CV.

SOLDERLESS SIDEWAYS ROM SOCKET BOARD



The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:

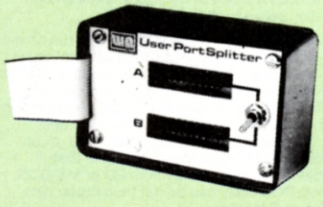
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £35
Battery Backup fitted **£39**
Battery Backup only **£3**
16K Sideways RAM **£8.50**
(carriage £3)

- Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

Only: £8

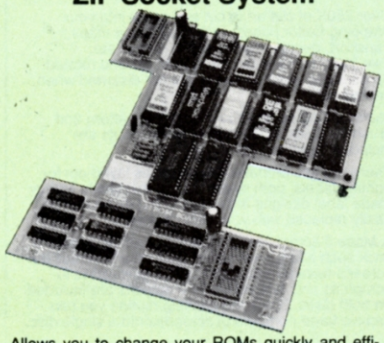
USER PORT SPLITTER UNIT



Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaneously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination

Excellent Value at **£22** (carr £2)

Sideways ROM ZIF Socket System



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.
- The low profile of the socket allows unrestricted access to the Keyboard.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for professionals and Hobbyists alike.)
- BBC, B+ and Master compatible.

ONLY **£18** (carr £3)

Low Profile CARTRIDGE SYSTEM

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack for the BBC B.

● Complete System	**£11**
● Spare Cartridges	**£2.75**
● Spare Rack	**£1.65**

ROM Cartridges for the BBC Master

Will accept the new larger PIggy Back ROMs like: Interword, Interbase, Quest, Conquest, etc

Twin **£9;** Quad **£14**

16K Disc Ram Module

(16K Sideways RAM Module)

Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

- Write protection (useful in a variety of circumstances)
- Compact construction
- No overheating or overloading problems.
- Free utilities disc supplied
- Can be used as a 16K PRINTER BUFFER.
- Ideal for profressional software development.
- Supplied with utilities software disc.

Only: **£29** (carr £2)

Optional Battery back-up fitted **£3**

ARIES CORNER

B-32 Shadow RAM Card

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Cobal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus, Interword and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved ★FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as th printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the 6502 processor socket on you BBC micro – no flying leads to connect and no soldering. Provision of the onboard ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

- Recommended by Computer Concepts for use with their Inter series of ROMs.

Price: **£69** (carr. £3)

Aries B-12 Sideways ROM Board

The B-12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

If you do not have a B32 or B20, a small adaptor module (the Aries-B12C) is available at a nominal cost

Price:	Aries B-12	**£36**
	Aries B-12C	**£5**

ARIES B-488 IEEE-488 INTERFACE UNIT

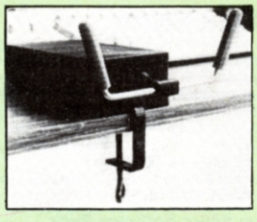
The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB or 'HP IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

£238 (Carr £3)

VOLTMACE JOYSTICKS

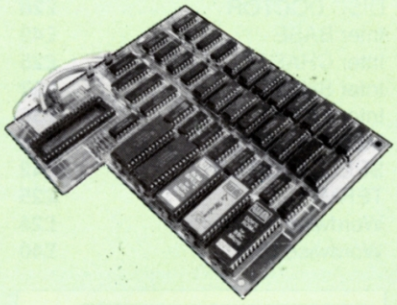
Delta 3B Single Joystick	**£10**
Delta 3B Twin Joysticks	**£15**
Delta 3C Joystick for Compact	**£10**
Delta 14B Single Joystick	**£11**
Delta 14B/1 Adaptor Module	**£12**
Transfer Software Disc-Tape	**£7**
Delta-Cat A mouse eliminator Joystick for the Archimedes	**£24**

Delta Base B



Analogue aircraft style yoke Joystick to run in the analogue port of the BBC B & Master 128 **£25**

ROM/RAM CARD



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 7 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Compatible with BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROMSPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

NTRODUCTORY PRICES:

- ROM/RAM card with 32k dynamic RAM **£48**
- ROM/RAM card with 64k dynamic RAM **£65**
- ROM/RAM card with a massive 128k dynamic RAM **£109**

(carriage on ROM-RAM Card £3)

OPTIONAL EXTRAS:

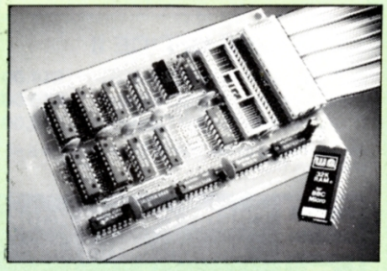
- 16k plug-in Static RAM kit **£9**
- 16k Dynamic RAM for Upgrade **£13**
- Battery backup **£3**
- Read and Write protect switches ..... **£2 each**

Complete ROM-RAM board
All options installed **£115**

P.S.
IS your existing ROM Board overflowing with ROMs? Do you need more Sideways RAM? Is your Board unreliable? Then upgrade to Watford, ROM/RAM Board and pay £5 less.

32K Shadow RAM/ Printer Buffer Card

Expansion Board



A MUST FOR WORD PROCESSING

Don't throw away your BBC B for a BBC B Plus or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16k or even 20k, but a massive 32k of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.
- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.
- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24k of text in memory. This product is recommended as an ideal complement by Computer Concepts.
- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20k of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28k of program space.
- Use the FULL 32k or the bottom 12k of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS432 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138, 145,ADVAL etc). Please note only a 12k printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.
- Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

Only £59 (carr £3)
(Price includes a comprehensive manual and the ROM)

BBC SOFTWARE'S Popular Educational Software

- Maths with a Story 1 (Disc). 4 primary level maths programs **£11.25**
- Maths with a Story 2 (Disc). 4 further maths programs. **£11.25**
- Picture Craft (Disc) 6-14 age group. Pack consists of flexible geometrical design & colouring programs. **£17.00**
- BONDING: Science O-Level Chemistry **£20.00**
- ELECTROMAGNETIC SPECTRUM (8 Discs) O-Level program. **£20.00**
- ELECTRONICS IN ACTION O-Level **£19.95**
- NEWTON & THE SPACE SHUTTLE O-Level program. **£20.00**
- ECOLOGY O-Level program. **£20.00**
- POLYMERS O-Level program. **£20.00**
- Classification & Periodic Table O-Level. The suite is supplied with its own database of chemical elements which can be classified according to your own rule. **£20.00**
- FOOD & POPULATION O-Level **£20.00**
- MICROTECHNOLOGY (Cassette) O-Level **£11.25**
- DEUTSCH DIREKT! (Disc & Audio Cassette) **£19.95**
- Modem Master (Disc) **£11.25**
- ADVANCED TELETEXT SYSTEM **£8.65**

Cont.

- PERIOD TABLE SOFTWARE **£20.00**
- Astronomy – Primary (Disc) **£12.00**
- Computers at Work – Primary **£17.35**
- Introducing Geography 11-17 years **£17.50**
- Electric Fields 6-14 years **£11.25**
- Black Queen Contract Bridge **£13.00**
- Espana Viva – 3 Discs **£19.95**
- WHITE KNIGHT Chess game **£16.00**
- Inside Science **£22.00**
- A Vous La France **£29.00**

More Educational Software

- **FUN SCHOOL 2 – Red:** Under 6 yrs – 8 programs on Discs, Shape Snap, Find the Mole, Teddy Count, Write a letter, Colour Train, Pick a Letter, Spell a Word & Teddy Bears Picnic. **£12.00**
- **FUN SCHOOL 2 – Green:** 6-8 yrs – Eight programs on Disc, Number Train, Shopping, Maths Maze, Treasure Hunt, Bounce, Packing Caterpillar, 3 Number jump **£12.25**
- **FUN SCHOOL 2 – Blue:** Over 8 yrs – Eight programs on Disc, Build a Bridge, Passage of Guardians, Unicorn, Logic Doors, Souvenirs, Code Boxes, Mystery Machine & Escape. **£12.50**
- Six French Games – Aimed at pupils in their first year of French, but also useful as revision for more advanced students 11 years+ **£26**
- More French Games – Another 6 games 12 years+ **£26**
- Au Restaurant and Accident de Route 12 years+ **£26**
- Boulogne and Oh-Les – 2 programs for beginners **£26**
- Letters to French Penpals – 11 years+ **£26**
- French Programs with Henri Beret – The programs in this series present vocabulary, grammar and role-play phrases in the form of animated games. 11-16 **£22**
- Six German Games – Aimed at pupils in their first year, but useful as revision for more advanced student of German. 12 years+ **£22**
- More German Games – Aimed at pupils in their 2nd year of learning German. 12 years+ **£22**
- The Cloze Program – Using context clues to predict is much more than a gap filling exercise. All ages **£26**
- An Introduction to Electronics – Brings together all the basic electronics required for a GCSE Physics or CDT course. 14-16 years **£26**
- Computer Control – This is a package of 3 programs simulating control of a greenhouse, a robotic arm & a chemical plant. 14-16 years **£26**
- The Nuclear Reactor – An interactive, menu driven program for GCSE pupils. Demonstrates & explains nuclear fission & the chain reaction. 14-16 years **£22**
- PUNCMAN Learning punctuation
  Puncman 1 & 2 for 7 – 13 years **£15**
  Puncman 3 & 4 for 8 – 14 years **£15**
  Puncman 5 & 6 for 8 – 15 years **£15**
- Yes Chancellor – A chance to take over number 11 at Downing Street. 12 years+ **£18**
- Letters & Pictures – Introduces phonic skills to Infants 6-8 years **£15**
- Numbers & Pictures – Early number learning is a great fun (4-6 years) **£15**
- Note Invaders – Budding musicians can learn the notes on the Clef with this elegant game 3 programs (7 to Adults) **£15**
- Maps & landscapes No. 1 (9-14 years) **£18**
- Help Your Child learn Basic Map work No. 2 (9-14 years) **£18**
- Pirate – Educational Adventure (8-14 years) **£15**
- Spelling Week by Week (6-14 years) **£18**

Archimedes Software

- BUMPER DISC **£14**
- Bumper Disc 2 **£14**
- Bookbinder **£43**
- Craftshop 2 **£29**
- DigiSim **£35**
- Jigsaw **£28**
- Craftshop 1 **£28**
- Desktop Stories **£27**
- Droom **£17**
- Numerator **£60**
- Gate Array Teaching System **£68**
- Fun School 2A Red (up to 6 years) **£14**
- Fun School 2A Green (6-8 years) **£14**
- Fun School 2A Blue **£14**

Continued→ → → → → → → → → →

VIEW 3.0 ROM	**£45**
VIEW PROFESSIONAL	**£50**
VIEWSHEET (Acornsoft)	**£36**
VIEWSTORE	**£36**
VIEWSPELL with 80 track disc	**£25**
VIEWPLOT Disc (Please specify for Master 128 or Compact)	**£20**
VIEW-INDEX	**£12**
OVERVIEW packs 1 & 2	**£65**
HI-VIEW	**£38**

Watford's own Sophisticated VIEW PRINTER DRIVERS

Epson FX80 & Kaga KP (Disc)	**£8**
Juki & Brother HR15 (Disc)	**£8**

OFFICE MASTER

CASHBOOK – A complete "Stand Alone" accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cashbook system and will provide you with a computerised system complete to trial balance.

FINAL ACCOUNTS – Will take data prepared by the Cashbook module and produce a complete set of accounts as following: Trial Balance with inbuilt rounding routine; Notes to the accounts; VAT Summary; Profit & Loss A/C; Balance Sheet.

MAILIST – A very versatile program. Enables you to keep records of names and addresses and then print, examine, sort and find them, all with special selection techniques.

EASILEDGER – A management aid software tool designed to run alongside an existing accounting system. Essentially a Debit/Credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information.

INVOICES & STATEMENTS – Greatly reduces the time and cost of preparing Invoices and Statements by storing essential information like customer names, addresses and account numbers. Has VAT routines and footer messages facility.

STOCK CONTROL – Allows you to enter stock received, stock out, summary of stock items and current holdings together with details of total cost, total stock to minimum level, units in stock ordering, quantity and supplier detail.

All this for only **£21** (Disc)

OFFICE MATE

- DATABASE
- BEEBCALC SPREADSHEET
- BEEBPLOT GRAPHICS

DATABASE – Set up a computerised card index system with powerful search facilities.

SPREADSHEET – Offers many calculation and editing features

BEEBPLOT – Provides visual representation from Spreadsheet data.

OFFICE MATE Only £10 (Disc)

Coming soon . . .

Archimedes Hand held Colour Scanner & A4 Page Scanner

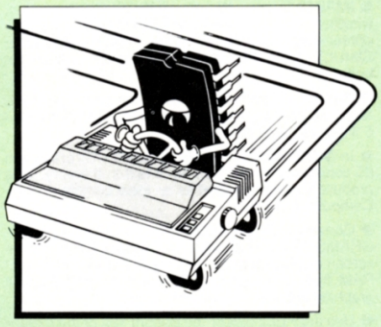
MINI OFFICE II

DISC Version for BBC B & B+	**£14.00**
DISC Version for BBC Master	**£16.00**
DISC Version for the Compact	**£18.00**

(When ordering please specify for which Micro & 40 or 80 track Disc)

CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383

VIEW PRINTER DRIVER ROM



View is a powerful word processor, but until now has seriously lacked in terms of printer support. With the launch of our Printer Driver ROM, which includes an extremely powerful and easy to use Printer Driver Generator, View users can find themselves in the realms of advanced word processing at only a small outlay.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, Panasonic KX-P1081/2, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built-in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redifinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute ★ command when printing.

Other features include a very powerful on-screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory-based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips.

Price: Only £33

COMPUTER CONCEPT'S ROMS

COMMUNICATOR	**£49**
DISC DOCTOR	**£28**
Inter BASE	**£49**
Inter CHART	**£25**
Inter SHEET	**£37**
Inter WORD	**£36**
MEGA-3 ROM	**£76**
SPELL MASTER	**£42**
TERMI	**£25**
Wordwise	**£24**
Wordwise Plus	**£40**

Wordwise plus **£40**

We are giving away absolutely **FREE,** the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear test-segment area.
- BBC B, B+ and Master compatible.

Only **£24**

(N.B. Word Aid requires a Disc interface in your Micro)

BOOK

The Complete Mouse User Guide to BBC Micro

This manual has been written to reveal the secrets of the mouse. It explains all the principles required by the hardware and associated software, and also example listings for inclusion into custom programs. The manual first details the basic principles of the mouse and a simple program which uses these principles. This information should be adequate for most applications. However, it is possible to improve the performance of the mouse by expanding on the principles already used in the software. This is again fully explained and an example program given.

It is possible to gain a full understanding of the mouse from this manual. For those not interested in exactly how the mouse functions, complete example programs are also included. These may be typed directly into the micro, without the need for any understanding of the hardware or software involved, enabling the mouse to be used for custom applications.

Price £5.95 (No VAT)

Example programs on Disc £4.95

BOOKS (No VAT on Books)

15 Hr Wordprocessing BBC/View	£6.95
15 Hr Wordprocessing BBC/WW & WW+	£6.95
30 Hour BASIC (BBC Micro)	£12.95
1st Word Plus Rel. 2 Manual	£10.00
A3000 Technical Manual	£29.00
Acorn DTP A Guide to	£17.00
Advanced User Guide for BBC	**£10.95**
Archimedes 1st Step – Beginners Guide	£9.95
Archimedes Assembly Language	£14.95
Archimedes BBC Basic Guide	£20
Archimedes DTP Manual	£10.00
Archimedes Operating System	£14.95
Archimedes Risc-Os Programmers Reference Manual	£79.00
Arm Assembly Lang. Prog. Manual	£15
Assembly Language Prog. for the BBC	£11.95
Assembly Language Quick Ref.	£21.95
BASIC 2 – User Guide	£2
Basic V – A Dabhand Guide	£9.95
BBC Basic Guide (Archimedes)	£19.95
BBC Computer Handbook – The Complete	**£14.95**
BBC Micro – Within the	£11.95
BCPL User Guide	£9
C Big Red Book of	£8.95
C – A Dabhand Guide to	£14.95
C Programming Lang. 2nd Edition	£24.95
COMAL – Introduction to	£9.50
Deutsch Direkt! (Book only)	£5.95
DISC FILING SYSTEM (DFS) Operating Manual for BBC	£6.95
FORTH on the BBC Micro	£9.95
Hackers Handbook – New	£9.95
ISO-PASCAL Reference Manual	£9.95
Mysteries of DISC DRIVES and DFS REVEALED	**£5.95**
Mastering Interpreters & Compilers	£14.95
Master 512 Guide – Dabs Press	£9.95
Master Operating System	£12.95
Master Reference Manual Part 1	£14
Master Reference Manual Part 2	£14
Master Reference Manual – Advanced	£17
Mathematical Programs in BBC BASIC	£9.95
MINI OFFICE II – A Dabhand Guide	£9.95
PASCAL on the BBC Micro	£9.50
PASCAL Programming	£10.95
Practical Disc File Techniques	£5.95
The Epson FX-KAGA PRINTER Commands REVEALED	**£5.95**
Understanding Interword – A Beginners Guide	£6.50
View 3.0 User Guide	£10
View Guide (View 2.1)	£5.00
View, Viewsheet & Viewstore – Mastering	£12.95
Viewsheet & Viewstore Dabhand Guide	£12.95
VIEW Dabhand Guide	£12.95
Viewsheet User Guide	£10
Viewstore User Guide	£10
Z88 – A Dabhand Guide	£14.95
Z88 Computing	£9.95
Z88 Magic	£14.95
Z88 Using Your	£9.95

Carriage on Books vary between £1 to £3.50, depending on their weight.

BOOKS for IBM PC & Compatibles

1-2-3 Mastering Release 3	£22.95
1-2-3 Mastering – 2nd Ed.	£20.95
1-2-3 Special Edition (QUE) – Using	£22.95
1-2-3 Using – Rel. 3	£22.95
8086/8088 Assembly Language Prog.	£13.50
8086/8088 Programming the	£17.95
Ability – Using	£12.95
Accountancy software in Business – Using	£14.95
Agenda – Using	£21.95
Aldus PageMaker – Using	£21.45
Amstrad PC Programmers Ref Guide	£7.50
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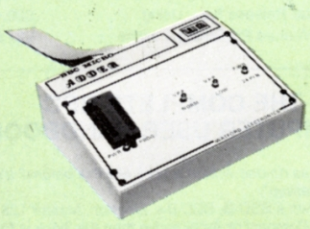

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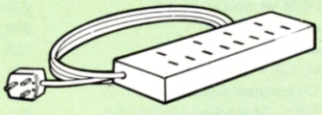

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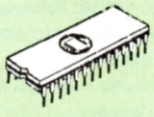

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- On-Board EMS

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The Aries portable has an energy-efficient 80C88 micro-processor that runs at 10MHz, a built-in high-capacity high speed, 20MB Hard disk drive, 1MB RAM, an advance LCD display, and a standard full-size keyboard with comfortable tactile feedback. The Aries Portable also has a full complement of six built-in ports (two RS232, one printer, one external FDD, one RGB monitor, one mouse), so you can add on extras wherever you settle down. All of this in a case so compact that it can easily fit inside your briefcase.

In his independent review (Computer Shopper, May 1990), the reviewer writes, – "Overall, the single most outstanding feature has to be the price tag. A notebook PC, with a hard disc selling for below £1,000 has no competition at the moment. If you have a small briefcase, weak arms or just like the concept of a truly portable computer then this is your man".

Just read the specification . . .

- **Processor:** 80C86 running at 10MHz Real time clock/calendar
- **Memory:** 1MB RAM (640K,384KbLIM/EMS)
- **Drive:** Built-in 2.5" 20MB Hard Disk Access Speed 28ms (optional external 3.5" 1.44MB)
- **Display:** EL backlit transflective supertwist LCD display, 80 characters x 25 lines, 640 x 200 bit-mapped graphics IBM CGA compatible
- **Stnd Interface** Parallel Printer Port. Two RS232C Serial Ports External disk drive port. CGA Colour monitor port External keyboard port or PS/2 mouse port
- **Stnd.Accessories:** AC mains adaptor/batt. charger. External FDD Convertor Battery pack
- **Dimensions:** 12"W x 2.4"H x 8.7"D
- **Weight:** Just over 7lb (incl. H'Disk/Batt.)
- **Power:** Internal removable Ni-cad batt. AC adaptor, 12V DC. Low battery indicator. Battery charge indicator
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ROUTINE MATTERS

Another selection of your handy routines brought together by Stephen Wade

This month featuring routines to...

- Add background music to your micro.
- Word wrap for your text output
- Screen fade for the border too
- Create attractive text displays
- Calculate compound interest

Music while you work

Author : Darren Smith Language :6502 code Filename : TPlayer

Many commercial games feature background tunes that continue playing regardless of what else your micro is doing. With this relatively short piece of 6502 code, you can now incorporate this feature into all your own programs.

Enter the program, SAVE it and RUN it, and after a few seconds a rendition of *The Black and White Rag* will begin to play.

The code works by taking each note in turn from where it is stored in page 9 of memory (&900-&9FF), determining whether it is short or long by testing bit zero, and then playing it according to the pitch stored in bits 1 to 7.

To ensure that the sound queue is updated at a sensible rate – and that the operating system is not left hanging around too long – the routine uses the *buffer becoming empty* event to refill it.

This is done by re-directing the event vector – *evntv* – which stores its pointer at memory locations &220 and &221, and using *FX14,0 to enable it.

No check is made to see whether the routine is already loaded, so don't run it twice unless you've pressed Break inbetween times. Also the Escape key can effect the way in which the routine works, so it is wise to use a *FX200,1 to disable its effects beforehand.

As it stands, the routine can play tunes of up to 256 notes – which should be plenty for most situations – but should you require a longer piece, the code could be modified easily.

```
 10 REM Background tune player
 20 REM by Darren Smith
 30 REM (c) The Micro User
 40 REM November 1990
 50 MODE 7:FOR pass=0 TO 2 STEP 2
 60 FOR pass=0 TO 2 STEP 2:P%=&A00
 70 P%=&A00:[OPT pass:.init LDA #0
 80 STA &9F:LDA #14:LDX #0:JSR &FFF4
 90 SEI:LDA &220:STA oldvector
100 LDA &221:STA oldvector+1
110 LDA #event MOD 256:STA &220
120 LDA #event DIV 256:STA &221
130 CLI:LDA #0:LDX #5:JMP event
140 .event PHA:CMP #0:BNE notevent
150 TXA:PHA:CMP #5:BNE notbuffer
160 TYA:PHA:.checknote LDX &9F
170 LDA &900,X:CMP #&FF:BNE findlength
180 LDX #0:STX &9F:.findlength
190 LDA &900,X:LSR A:BCC short
200 .long LDA speed:ASL A:STA sound+6
210 JMP mask pitch:.short LDA speed
220 STA sound+6:.mask pitch
230 LDA &900,X:AND #&FE:STA sound+4
240 .playnote:LDA #7:LDX #sound MOD256
250 LDY #sound DIV256:JSR &FFF1
260 .nextnote INC &9F:.endcode
270 PLA:TAY:.notbuffer PLA:TAX
280 .notevent PLA:JMP (oldvector)
290 .oldvector OPT FNw(0):.speed
300 OPT FNb(3):.sound OPT FNw(1)
310 OPT FNw(-8):OPT FNw(0):OPT FNw(4)
320 ]:NEXT:loop=0:REPEAT:READ data:IF
data=1000 THEN 330 ELSE ?(&900+loop)=dat
a:loop=loop+1:UNTIL 0
330 CALL init:END
340 DEFFNb(Z%):?P%=Z%:P%=P%+1:=pass
350 DEFFNw(Z%):!P%=Z%:P%=P%+2:=pass
360 REM *** Tune data ***
370 DATA 133,116,121,108,113,96,101,80
,84,72,65,0,113,64,113,65,113,1,113,109
380 DATA 104,112,128,104,112,128,104,1
12,128,104,112,129,120,112,104,96,100
390 DATA 120,96,100,120,96,100,120,96,
100,121,112,100,84,105,100,105,100,105
400 DATA 93,88,93,88,93,84,60,64,84,10
0,80,84,100,112,96,100,112,133,101,104
410 DATA 112,128,104,112,128,104,112,1
28,104,112,129,120,112,104,96,100,120
420 DATA 96,100,120,96,100,120,96,100,
121,112,100,84,120,72,88,121,112,104
430 DATA 100,92,88,92,121,112,104,92,1
00,64,84,101,64,93,85,113,109,104,112
440 DATA 128,104,112,128,104,112,128,1
04,112,129,120,112,104,96,100,120,96
450 DATA 100,120,96,100,120,96,100,121
,112,100,84,105,100,105,100,105,93,88
460 DATA 93,88,93,84,60,64,84,100,80,8
4,100,112,96,100,112,133,101,104,112
470 DATA 128,104,112,128,104,112,128,1
04,112,129,120,112,104,96,100,120,96
480 DATA 100,120,96,100,120,96,100,121
,112,100,84,120,72,88,121,112,104,100
490 DATA 92,88,92,121,112,104,92,100,6
4,84,101,64,93,85,255,1000
```

Interested in money

Author : Henry Brooks
Language : Basic
Filename : IntCalc

Calculating compound interest is an easy but repetitive task for which a micro is ideally suited. This program asks you how much your initial investment was, what the current interest rate is and how many years you wish the money to compound for.

From these facts your micro will produce a list of figures accurate to two decimal places telling you exactly how much interest has been earned in all, and how much the overall investment is worth, for each year within the specified period.

```
 10 n$="Compound interest calculator"
 20 REM by Henry Brooks
 30 REM (c) The Micro User
 40 REM November 1990
 50 MODE 6:PRINT n$:FOR num=1 TO LEN(n
$):PRINT " ";:NEXT
 60 INPUT '"Inital investment = "inv
:INPUT '"Interest rate = % "int:INPUT '
'"Number of years = "time
 70 PRINT''"Year";TAB(10);"Total inte
rest";TAB(26)"Total capital""number";TA
B(10);"in ";TAB(26)"in "
 80 FOR loop=1 TO time:a%=0:PRINT loop
;:a%=&2020A:cap=inv*(1+int/100)^loop:PRI
NT TAB(13)cap-inv;:PRINT TAB(26)cap:NEXT
:END
```

Monthly cassette and disc

All of this month's routines can be found on the monthly subscription disc and cassette. On the 5.25" disc the programs reside in the "R" directory, and on the 3.5" disc in the "RoutMats" directory.

Those routines designed to work on the Archimedes series and A3000 micros are already file-typed on the 3.5" disc for your benefit – they are the ones without a blank icon when viewed at in the desktop environment.

No more splitting words

Author : Sandy McAfee Language :Basic Filename : WordWrp

In many computing applications you need to prevent words being split over two lines. This can be in almost any length of program – from simple text display utilities up to fully-fledged adventure games.

One method is to add padding spaces to the text, which – although it usually works – can lead to substantial increases in length and wastes memory. In the case of short programs this does not really affect matters, but in much longer ones the need for space is vital.

This program tackles the problem by two short procedures. The first – PROCword–wrap – takes parameters of the string to be printed followed by the number of columns to display it in. Using these the string is scrutinised until the word which would be split is found, at this point PROCback–peddle being called.

The second procedure works backwards through the text until the last space is found, subtracts the word to be wrapped around from the string, and prints the remainder on the screen. This process is repeated until the end of the string is reached.

Although the routine is designed to justify text to the left hand side of the current window, it could easily be modified or entended to centre or right-justify the text instead.

```
  10 REM Word wrap text printer
  20 REM by Sandy McAfee
  30 REM (c) The Micro User
  40 REM November 1990
  50 MODE 7:PROCword wrap("This is a de
monstration of word wrap at a line lengt
h of 25 characters.",25)
  60 PRINT:PROCword wrap("This is a dem
onstration of word wrap at a line length
of 35 characters.",35):END
1000 DEFPROCword wrap(Z$,N%)
1010 S%=1:C%=N%:REPEAT
1020 B$=MID$(Z$,S%,N%):Z%=0:REPEAT
1030 Z%=Z%+1:C$=MID$(B$,Z%,1)
1040 UNTIL ASC(C$)=-1 OR Z%=N%
1050 IF ASC(C$)=-1 OR ASC(C$)=32 PRINT
B$:C%=N% ELSE PROCback peddle
1060 S%=S%+C%:UNTIL ASC(C$)=-1:ENDPROC
1070 DEFPROCback peddle
1080 D%=0:REPEAT:D%=D%+1
1090 D$=RIGHT$(B$,D%):UNTIL ASC(D$)=32
1100 C%=N%+1-D%:B$=MID$(Z$,S%,C%)
1110 PRINT B$:ENDPROC
```

Fading in full effect

Author : Matthew Edgar Language ARM code Filename :Fade2

This short piece of ARM code is intended to enhance my screen fading utility published in the September *Routine Matters* which did not fade the border. By using the *OS–ReadPalette* call it is possible to find the current border colour setting and hence change it.

Load up the original program, add the lines listed below – making sure not to alter any of the line numbers – and then SAVE the extended version. A new version of the *Fade* utility is generated and automatically stored on your disc.

Again, using the utility couldn't be simpler – just enter **Fade* at the appropriate moment.

```
 10 REM >Fade2
 60 REM September/November 1990
120 STMFD R13!,{R0-R5,R14}
445 BL border
470 LDMFD R13!,{R0-R5,PC}:.border
471 STMFD R13!,{R0-R3,R14}:MOV R0,ptr
472 MOV R1,#24:STRB R1,[R0,#1]
473 SWI "OS ReadPalette":MOV R1,#2
474 .loop:MOV R2,R2,ROR #8
475 AND R3,R2,#&FF:SUBS R3,R3,sixteen
476 MOVMI R3,#0:STRB R3,[R0,R1]
477 ADD R1,R1,#1:CMP R1,#5:BNE loop
478 MOV ptr,R0:MOV R0,#12
479 SWI "OS Word"
480 LDMFD R13!,{R0-R3,PC}
```

Subscribers to the Archimedes monthly disc can find the full listing within the *RoutMats* directory.

If you have written a routine that may be of interest to other readers, and suitable for publication in this column, do not hesitate in sending it on disc or tape along with documentation to:

Stephen Wade, Routine Matters, The Micro User, Europa House, Adlington Park, Macclesfield SK10 4NP

Don't forget to tell us your name, address and telephone number, and enclose a stamped addressed envelope to guarantee the return of your media. Also provide us with a declaration stating that the routine is all your own work, has not been submitted elsewhere, and that we have your permission to use it.

Outlined text with ease

Author : John Walsh
Language : Basic
Filename : Outline

Creating attractive displays on your micro is not difficult but can require a large amount of memory. Text-only displays suffer particularly – the usual solution is to use double height in the heading, and leave the main body text in the standard machine font

Some commercial programs redefine the whole character set. But again, unless you have a Master or an Archimedes this can take up a large chunk of ram.

Coupled with the use of Mode 1 for the benefit of colour with reasonable sized text, it is possible to end up with virtually no free memory before you start. The solution is to capitalise on those resources already available – the standard font in this case – by using them to our best advantage.

This routine enables writing at the graphics cursor and then reprints a given string of text in several different positions – each slightly offset from another – to give the effect of outlined text.

In the program, the short procedure named *outline* – when called along with with several parameters – does this for us.

The first parameter is that of the string of text to be printed – naturally encased within quotation marks – followed by the *x* and *y* positions based on the text co-ordinate system. Finally, the outline and centre colours respectively are required.

As the routine writes text at the graphics cursor, it will not work in modes three, six or seven.

```
  10 REM Outlined text
  20 REM by John Walsh
  30 REM (c) The Micro User
  40 REM November 1990
  50 MODE 1
  60 PROCoutline("This is a demonstrati
on of some",1,1,2,1)
  70 PROCoutline("outlined text which i
s produced using",1,3,3,0)
  80 PROCoutline("the PROCoutline routi
ne contained",1,5,3,1)
  90 PROCoutline("within this program."
,1,7,2,0):END
 100 DEF PROCoutline(text$,x,y,c1,c2)
 110 gx=x*32:gy=1024-(y*32):VDU 5
 120 GCOL 0,c1
 130 MOVE gx-4,gy:PRINT text$
 140 MOVE gx+4,gy:PRINT text$
 150 MOVE gx,gy-4:PRINT text$
 160 MOVE gx,gy+4:PRINT text$
 170 MOVE gx-4,gy-4:PRINT text$
 180 MOVE gx+4,gy-4:PRINT text$
 190 MOVE gx+4,gy+4:PRINT text$
 200 MOVE gx-4,gy+4:PRINT text$
 210 GCOL 0,c2:MOVE gx,gy:PRINT text$
 220 VDU 4:ENDPROC
```

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Interlink

Need to transfer data? Steve Turnbull checks out a new product that will make your life much easier

Product: Multi-tasking Serial Link
Price: £9 (software only), £20 (including connecting lead)
Supplier: Ivoryash Ltd., 14 Perwell Close, Bredon, Tewkesbury, Glos., GL20 7LJ

WHEN the Archimedes 310 was first released several companies jumped at the chance of producing data transfer software for linking with the BBC Micro. But in all cases the software was not multi-tasking because Risc OS hadn't been invented.

After Risc OS appeared there were minor upgrades for compatibility but multi-tasking was not added. But now comes the multi-tasking serial link from a new company – Ivoryash.

The package is very simple, you just get a single application on the disc plus documentation. Having attached the lead – about 1.5 metres in length – to both machines just type:

```
*FX7,7
*FX2,1
```

On the 8 bit machine and double-click the application on the Archimedes. After a few moments you get a copyright message and the BBC Micro begins to spool the communication program. That takes about 30 seconds.

Once the program has stopped spooling it is automatically run and the BBC Micro screen comes up with a banner at the top with the rest of the screen clear. On the 32 bit micro you get a new drive icon with the letters BBC beneath it.

Clicking on it brings a veritable explosion of activity on the BBC Micro as a whole stream of DIR commands are sent to find out which directories on the DFS disc contain files – this is not required if you have the 8 bit ADFS.

Once completed, a new window appears with all the files on the DFS shown with approximated file types plus directories for those that contain further files.

This link is not a proper Filer so it maintains its own window, as a result all the useful menu options are not available. However you can delete and rename files individually or as groups if you need to.

Files are copied to and from the DFS disc by dragging them. In fact you can drag direct into application windows, for example bringing text from the 8 bit machine straight into !Edit.

I had a problem initially involving long files hanging up halfway through. A phone call to Ivoryash revealed the presence of a variable in the 8 bit program used to slow

More

ALTHOUGH a number of programs and applications are available for transferring files from Model B DFS discs to the Archimedes ADFS format, ArcDFS from Dabs Press is the first that I've seen to provide a complete Model B type filing system for your Archimedes.

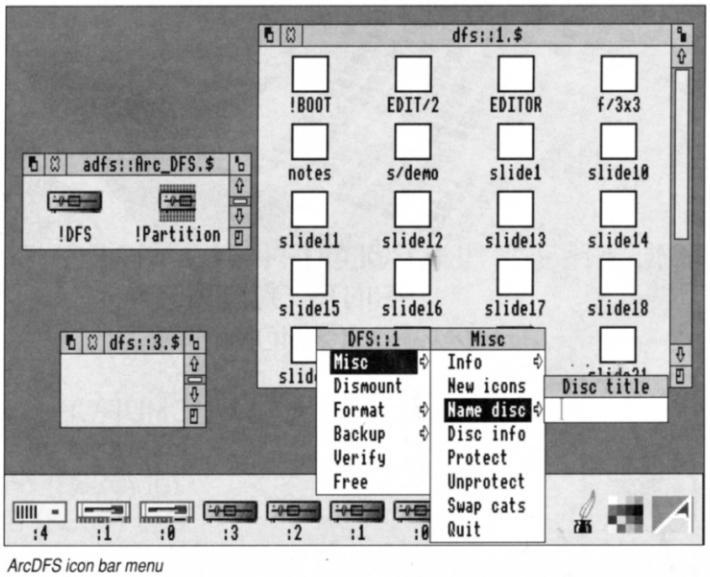
The comprehensive manual provided with the software clearly outlines the use of ArcDFS, some differences and enhancements. You are quite properly referred to the Acorn Disc Filing System User Guide for detailed information about the DFS.

An important point when reading this review is that this software assumes that all the discs it's trying to access are integral to the machine. If you want to handle 5.25in discs you will need the appropriate interface.

ArcDFS is not only a remarkably complete implementation of the Acorn DFS, but it can also read format and write to Watford and Solidisc DFS formats, both single and double density. It is also able to handle and swap double catalogues of the type used in Disc Doctor. However, a surprising omission is the *COMPACT command. The manual points out that the command isn't implemented but not why.

ArcDFS provides a complete Filer interface which makes transfers ridiculously simple. From the command line, or Basic, you also have all the familiar DFS commands, plus a few extra ones.

ArcDFS can create ram drives in a very similar manner to that used by the ADFS



ArcDFS icon bar menu

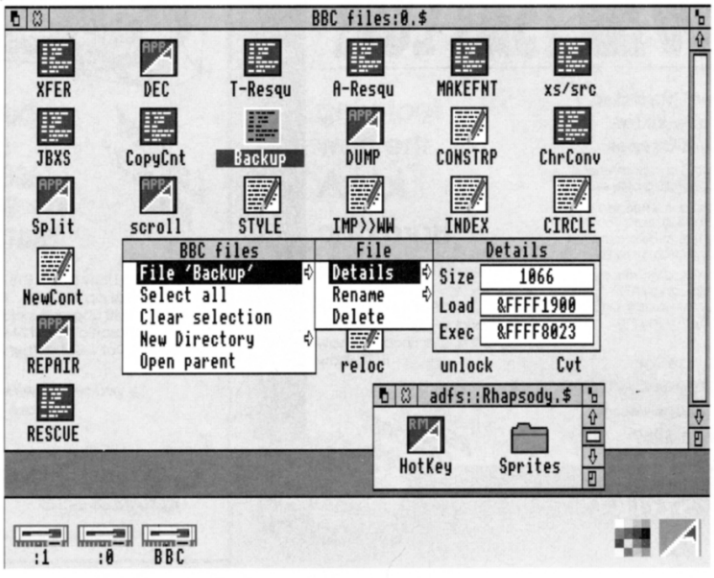
the link slightly. Increasing this value slows the transfer but prevented hang ups.

The package is not perfect – it alters the load and execution values of programs so if you archive or create data on the Archimedes ensure when it goes over the link that machine code addresses are not involved.

Also I modified the Archimedes program so that it didn't send the BBC Micro program across the link if the Control key was held down, as it's simpler just to save the program on a DFS disc and load it when needed rather than waste time each time you want it.

Summing up

Despite the minor problems, I have found this link to be vital in transferring data back and forth between the machines. Even if you only need it for a one-off set of transfers the low cost makes it very worthwhile.



The Serial Link assigns file types

connectivity

Terry Blunt explores a DFS handler for integral 5.25in discs

Product: ArcDFS
Price: £29.95
Supplier: Dabs Press, 22 Warwick Street, Prestwich, Manchester M25 7HN.
Tel: 061 773 8632

but in this case free RMA space is used and you are given step-by-step setting up instructions. This is particularly useful for fast disc copying on a single 5.25in. drive.

An unexpected bonus is the ability to set up a DFS partition on any ADFS disc. This is done with a special file located in the !DFS directory and is rather similar to setting up an MSdos partition. You can have up to three partitioned drives on a single floppy – a three-sided disc.

ArcDFS works well with both the !65Tube and !65Host emulators, giving you an even closer approximation to the old machine. I can now maintain all but the most obstinate programs for other teachers without having to rob them of a Master, or dig out our single, elderly Model B from the store room.

I found one anomaly when trying to count all the files on a disc. I was given the error message *File' :1.$' not found*. Counting individual files presented no problems, so I don't know if this is a bug or whether some part of the Filer is not fully implemented.

There is, however, one serious deficiency in ArcDFS: It cannot perform a software double-step to read 40 track discs on an 80 track drive. So you must either own a 40 track drive or have a hardware switchable one.

There is one final option though. If you have the Pres A3K2 with DriveLatch module the ArcDFS is modified by its software double-stepping, making it possible to read both types of disc.

One useful refinement that Dabs might like to consider would be the ability to start up with only one DFS drive on the icon bar. Mine gets pretty full these days and the addition of up to eight more from just one piece of software makes things a bit silly – I only use drive 1 on DFS to produce 5.25in DFS discs readable by single sided drives.

Techie talk

For the technically minded, ArcDFS uses a buffer size of 1k for open files, rather than the 256 bytes of the real DFS. This results in faster data transfers, particularly where several files are opened at the same time.

Mind you, what you aren't told is that you can have up to 23 files open at any time. Considerable low level support is provided, including Osword &7D, &7E and part of &7F. You are referred to the Advanced User Guide for more details.

Summing up

ArcDFS is an excellent piece of software, in spite of my two small niggles. At only £29.95 it represents real value.I only wish I'd had such an application when I first moved over to the Archimedes.

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Steve Turnbull gets to grips with the new flagship of the Acorn range

Power computing

EVERYBODY knows that the Archimedes range is fast – thanks to the superb design of the ARM chip set produced by Acorn's R & D team. What's not so well known is that the BBC A3000 and A400 series are actually operating well below their maximum speed to allow them to use relatively cheap memory chips and keep the price down.

Well now Acorn have released a machine that begins to tap the real power that has, until now, been hidden.

A540 hardware

The A540 looks exactly the same as an A440 – apart from the single digit change on the label – although the keyboard mechanism has been altered to that of the A3000. The standard machine comes with one 800k ADFS 3.5in floppy drive and an integral SCSI hard drive with an astounding capacity of 100Mb with a data transfer rate of 5Mb/sec.

The processor in the new A540 is an ARM3 with 4k of on-chip cache ram and with a clock speed of 30MHz and the ram running at 12MHz.

Now these numbers mean very little because clock frequency has only an indirect effect on the final speed of a machine, so let's define a few terms and examine the facts of the case:

The speed of a computer's processor chip is measured in mips – millions of instructions per second. This is not necessarily the best yardstick but it's the most common.

So what is clock speed? On an ARM processor every tick of the clock means that one instruction has been executed. So 8MHz meant eight million instructions per second and 30MHz means 30 million per second – theoretically.

But notice that this isn't always the case, a 33MHz IBM PC is not performing 33 million instructions per second, because on these machines it often takes more than one clock tick to process each instruction and even if it only takes an average of two clock ticks the speed immediately drops to 16 mips.

However, getting back to the ARM chips, the situation is complicated by memory access, which has to go at the speed of the memory. On the existing machines the memory has 250ns access time which is equivalent to 4MHz. Averaging out – assuming roughly equal proportions of instructions requiring memory access to those which don't – we get 6 mips on the 400 series.

The A540 has 12MHz memory so averages out at about 21 mips and we can predict that the new machine ought to be about three and a half times faster.

But there's still the 4k of cache ram to consider. What this does is keep a copy of commonly used memory locations so that if the program being run repeatedly accesses them it just reads the data from the cache – which is very fast – rather than from main memory.

Of course when data is written into memory both the cache and the main memory need to be altered. The usefulness of cache ram varies considerably from application to application, but it will usually provide some increase in performance.

You get a standard 4Mb of ram in the A540, but this is upgradable in 4Mb chunks to a maximum of 16Mb. Each chunk is available as a seperate plug-in board, shown in Figure I, which comes with its own MEMC1a chip – each of these can only handle 4Mb which is why you need an extra one for each chunk.

This amount of memory might seem a lot, but for professional applications such as image processing, which can involve huge sprites, it's merely acceptable.

A typical image could comprise 1,000 by 1,000 pixels of 32 bit colour which adds up to 4Mb. Then just suppose you wanted to rotate this image? You'd need another 4Mb

➤

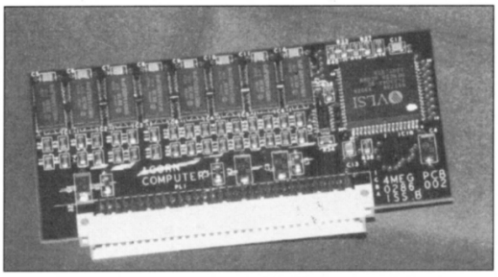

Figure I: One of the 4Mb cards with MEMC1a chip

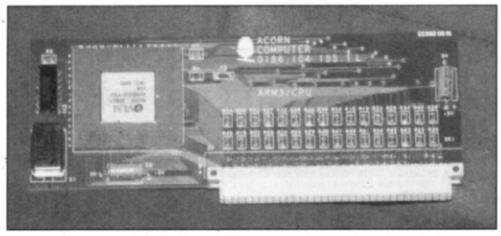

Figure II: The ARM3 processor chip on a plug-in card

➤

at least, and the program itself has to fit somewhere...

Another speed option that will be available next year is a floating point co-processor chip. It is possible to create machine code programs which use special floating point instructions, however unless you have a special maths co-processor chip in your machine, these instructions are intercepted and routed to an emulator program to perform.

The Draw module uses these quite extensively, but you don't notice any particular slow down because you're used to it.

The 400 series can have an expansion card with a maths co-processor on it added to speed up these operations, but it's not a common option. However in 1991 Acorn will be producing their own floating point chip which will be available on a card to plug directly into the A540.

In fact the ARM3 chip itself is on a board (see Figure II) and all you'll need to do is unplug that and insert the new board which will contain another ARM3 and new ARM-FPA. From this point Draw files will be rendered like lightning – bear in mind that on the A540 it's already three times faster – and you'll wonder how you ever did without it.

One of the key factors in the design of the new A540 is this ability to simply exchange cards – even down to the central processor – to provide upgrades in technology.

If Acorn ever produced a faster ARM chip or a third party supplier wanted to provide an onboard signal processing chip, it would be just a matter of plugging in the new equipment.

Another area that has been significantly enhanced is in the video circuitry. In many ways the design concept behind the Archimedes machines is similar to that of the Electron. There are very few, if any, specialised chips to handle the screen modes, all the work in sending the display to the screen is done by the central processor in association with the video chip.

This means that screen modes which use more memory slow the whole machine down. This puts a practical limit on the complexity of the screen available to the 400 series because it can only process a certain amount of data in the given time.

But the A540 is so much faster overall that it's capable of matching the VGA and super VGA screen modes of the IBM compatibles. As an aside, the PC's have seperate cards with special onboard processors to handle these screen modes.

Table I gives a brief rundown on the new modes included in the machine but don't forget that it's perfectly feasible to design your own screen modes. The A540 will work with standard displays, but you'll need a multi-sync monitor to take advantage of high resolution modes.

All existing expansion cards will work perfectly on the new machine and Acorn can supply a card which will allow connection to the widely-used Ethernet network. Econet hardware is also available.

The sound system has not been altered significantly – you can plug in the usual Midi cards if that's what you need.

Name	Resolution	Colours
VGA	640x480	16
VGA	640x480	256
SVGA	800x600	16

Table I: New screen modes included

A540 software

Turning on the machine is almost an anti–climax,. I'm not really sure what I was expecting – a fanfare perhaps – but the trouble is that the A540 is exactly the same as all the other machines except for the glimpse of 8192k during the boot-up sequence.

In fact the Risc OS software has not been altered at all except for slight changes to allow it to access up to 16Mb of ram instead of the usual 4Mb.

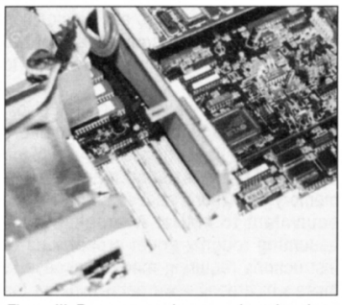

Figure III: Processor and memory board sockets located between backplane and floppy drive

Moving windows around seems the same except that when using the continuous window scroll option the results are much smoother. I took a peek at the Task Manager window and found it quite a bit wider than on the earlier machines although most of it's just empty space so the drag bars can be pulled further. The Menu icon was similarly unaltered. However, as mentioned, the range of screen modes has been increased.

The A540 certainly makes a big difference in the handling of desktop publishing programs. The first point is the speed at which the outline fonts are cached to memory – surprise, it's faster. In fact, about four times faster.

Rendering a page of text to the screen for the first time is significantly speeded up and complex pages with lots of frames appear in a quarter of the time.

With the outline font manager comes the ability to limit the size of text above which it won't be cached, but drawn on to the screen directly each time. On the 400 series this can seriously affect the speed with which screens are displayed, but on the A540 the delay was barely noticeable.

The font cache limit on the A540 remains unaltered at 1Mb – although why it was pegged at that in the first place I can't imagine.

One significant area of difficulty that owners of the A540 are going to run into is in playing games. They all go too fast. This makes strategy games against the computer much harder – they have four times the thinking power – and in arcade games the action takes place at ridiculous speeds. I tried playing Interdictor – it wasn't impossible but it was certainly fast.

One of the most amusing results of this vast increase in computing power lies in the field of emulation: The PC Emulator now runs at the speed of a real PC AT and the !65Host is faster than a BBC Micro.

Summing up

This machine really isn't for the hobbyist, but is fine for professionals with high processing requirements on their desktop and it makes existing software run extremely fast.

In terms of raw power coupled with ease of use it exceeds a 486 PC by miles, and rates well above an Apple Mac IIfx. And it costs much less than either. At the moment the A540 lacks the professional software to compete with them both – but that will change.

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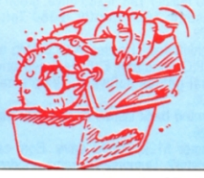

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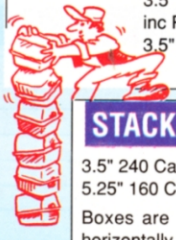

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Wordwise for the

Christopher Waldock shows how you can turn a word processor into a powerful database

```
 Start
REM WW+ Database
REM Sample file
REM -------------

2*M
99
Andrews
Mr. Pete
19 Arnos Bldgs
Hazel Grove
Stockport
```

```
Press"L" to move down a LINE
Press"T" to go to TOP of record
Press"U" to go UP a line
Press"N" to move to NEXT record
Press"B" to move BACK
Press"S" to SEARCH for word(s)
Press"R" to REPEAT search
Press"F" to FIND PLACE for new record
      PRINTING A RECORD
```

THOSE who have enjoyed the immediacy, speed of operation and power of good rom software on the BBC Micro must sometimes feel disappointed when they change up to the so-called more powerful machines and explore their software offerings.

As an example look at Wordwise Plus, which has a quite uncommon and useful feature – a built-in text processing language which will alter the text actually in the machine's memory. The fact that such remarkable power and versatility comes as a mere 16k rom is even more amazing.

If you have never explored the Wordwise Plus language, why not try it? Quite useful results may be obtained with a few lines of code, and it can be fun to watch the effects of segment programs on your text. But do save the original text first.

One application I have developed with it over the years is a database for my wife's swimming club. During that time it has been changed a number of times to enhance its usefulness and as new needs have arisen.

Thanks to the power of Wordwise Plus, it is very easy to alter the textual arrangement – the layout of the fields that make up records – to make text manipulation easier.

Capacity

Each text or data file holds about 200 members and we keep all the information in two record files.

There is no great disadvantage in working this way, though you could chain successive data files automatically if you wanted to and so have a facility limited only by your disc capacity.

A text or data file could hold more than 200 members, but with the data and operating segments loaded, it's better to have around 8000 characters left to operate with. The applications need some memory to do their work and sometimes you will need to load in larger segments for special purposes.

Unnecessary characters are cut from the data to maximise capacity – *Rd* is used rather than *Road* for instance. And there's no need for commas at the end of lines – they can be inserted by the printing program, if required.

Arrangement of data

The data file has a four-line header: Two of text, one of underlining, and one blank, these are allowed for in the segment programs. After making any changes in the data, it's sound practice to alter the date in the header.

When you have typed in your four lines of heading, as above, type ">END" as an end marker. Your first record will be built up from the end marker using the facilities in

➤

1	Michael Madderley
2	Mrs Jones
3	Mr Jones
4	Mr C M Box
5	Anne Martin
6	Mrs Barbara Hentin
7	Alex Mason
8	Robin Major
9	Ian McGee
10	Mr McGee
11	Hannah McMurray
12	Mrs Beryl Marshall
13	Clair Morell
14	Ben Allison
15	Danielle Bright
16	Andrew Morrell
17	Ben Morrell
18	Mr Gary Carothers
19	Jason Davis
20	Richard Midway
21	Lee Andrews
22	Mr Keith Nicholas
23	Emma Brandt
24	Mrs M O'Neill
25	Amy Cartwright
26	Emma Preen
27	Mr Nigel Warden
28	Charlotte Hankings
29	Adrian Percy
30	Amanda Drummer

1	Ben Allison
2	Lee Andrews
3	Mr C M Box
4	Emma Brandt
5	Danielle Bright
6	Mr Gary Carothers
7	Amy Cartwright
8	Jason Davis
9	Amanda Drummer
10	Charlotte Hankings
11	Mrs Barbara Hentin
12	Mr Jones
13	Mrs Jones
14	Michael Madderley
15	Robin Major
16	Mrs Beryl Marshall
17	Anne Martin
18	Alex Mason
19	Ian McGee
20	Mr McGee
21	Hannah McMurray
22	Richard Midway
23	Clair Morell
24	Andrew Morrell
25	Ben Morrell
26	Mr Keith Nicholas
27	Mrs M O'Neill
28	Adrian Percy
29	Emma Preen
30	Mr Nigel Warden

Attendance list before and after sofrting

the main program, called Routine. You will notice that *zzz* and a number of blank lines are also added to the end to make option F(ind) work without fail.

The records each take 9 lines, as follows:

- A code line
- A date-of-birth line
- Surname
- Title and forename or initials
- First Address Line
- Second Address Line
- Third Address Line – or Town
- Telephone number
- A blank line

Each code line is prefixed by > – though any uncommon character would do. Following this, the swimming club codes include a * or /, to show subscriptions paid or unpaid. It later became necessary to add M or F for statistics. You can choose any code-characters you like, or ordinary letters. The > record marker makes FIND operations simple.

The date-of-birth is used for junior members, in reverse order: 85.10.23 is much easier to sort into age order. Adults are recognized by the code 99, which is converted to *adult* before being printed out.

If the second address line is not used, it should be left blank. The final blank line is, of course, only a single character in memory, and is added for legibility.

You should use the routine functions provided, rather than alter the text directly as this ensures the arrangement of text will always be in the order shown above, with blank lines as necessary. This order is essential if you want to run the programs without change. If your data does not fit this

Wordwise Plus programming hints

If you have produced a complicated segment program, you will want to save it for future reference, with sufficient information to understand the operations in case you want to make changes later. If you don't you may later find it easier to re-write the whole program. If you don't spend time now you may spend more later.

- Variable names are limited to one letter so define these in your documentation.
- Variable names must be in capitals.
- For contrast put commands in lowercase.
- The actual programs run can be made much shorter. Spaces are not needed after commands or variables. The minimum REM should be the program name.

The keywords in the programs provided have, for legibility, been given in full. However, you can put each one into the main text area, load the program Compres into, say, segment zero then press Shift-f0 to run it. This will strip out the REMs and convert most keywords to their minimum form.

The word *text* has two meanings in this language:

Select text means select the main text area so that all further operations act on it – only the text menu has search and replace as option five. Both main text and segments can be used to hold and manipulate textual data but only segments can be used to run programs. You can issue the command *type segment n* to copy all the text from a segment to the current work space but you cannot do the same with material in the text space.

The other meaning of text is the whole contents of main text or segment – whichever space you are working in currently. *Delete text* will clear the currently selected work space. *Save text* will save the whole of the current work space.

Some other programming points to consider:

Commands like GCK$, GLT$ look a bit daunting but they follow a simple system. Commands starting GC get a single character without a return and GL takes a string with a Return – CHR$13 – at the end. The next letter specifies whether data is to come from T(ext), K(eyboard), or F(ile).

When developing programs, most errors arise because you are not clear where the cursor lies after an operation. There are two ways to overcome this:

Develop code in menu mode. You type a colon (:) then the command – which can be abbreviated. Now inspect the result in the text. Make a note on paper of every successful command to be added to the program. Remember that unlike a Basic program, you do not lose your variables when you add a new line of code and re-run. You can carry on testing with the same variables.

Put in a breakpoint in your program where you wish to examine the effect of the code – include the command procBREAK. And add the procedure BREAK, as follows:

```
.BREAK
 select text (or segment as
 necessary)
 display
 if get<>32 then end
 endproc
```

- **A** Add a record will automatically add the surname after a F(ind).
- **B** Moves back by one record.
- **C** Copy is useful when you have several members of the same family and only want to alter the date of birth and forename with I(nsert).
- **D** Deletes a whole record and prompts for confirmation.
- **E** End takes you out of the program and warns you with a beep.
- **H** Lists the commands plus a brief summary of their actions.
- **I** Replaces a line but gives you a chance to change your mind.
- **L** Moves down a line.
- **N** Moves to the next record.
- **P** Print will print out the address for a label.
- **T** Moves to the top of the current record.
- **U** Moves up one line.

The commands can be entered in either upper or lower case

```
REM.. D.ROUTINE
REM.. BY C J Waldock
REM.. (C) The Micro User
REM.. see procHELP for information
REM.. Set constant R$,carriage return
 R$=chr$ 13
REM.. Set constant N$,newline
 N$=R$+chr$ 10
REM.. Q$=prompt for input
 Q$=" ==> "
REM.. message M$
 M$=N$+"To continue PRESS ANY KEY"+Q$
REM.. see endmarkers complete
 procZZZ
REM.. get left margin to print a record
 procLM
select text
 if EOT then procHOM
 if SOT then cursor down 4
procLOC
 REM.. M1 starts main loop
.M1
  cursor at 0
  display
 REM.. get option from keyboard
  A%=get
 REM.. change UPPERCASE to LOWERCASE
  if A%>64 and A%<91 then A%=A%+32
REM.. Rather than actual values like
REM..  108 ASC"l" may be inserted
 if A%=108 then goto LN
 if A%=110 then goto NX
 if A%=98 then goto BK
 if A%=112 then goto PR
 if A%=115 then goto SCH
 if A%=114 then goto REP
 if A%=102 then goto FIN
 if A%=116 then procLOC
 if A%=117 then goto UP
 if A%=100 then goto DEL
 if A%=99 then goto COP
 if A%=97 then goto ADD
 if A%=105 then goto INS
 if A%=101 then goto END
 if A%=104 then goto HELP
goto M1

.ZZZ
 REM.. First wipe out text at end
  select text
  cursor top
  find ">END"
  fkey 3
  cursor bottom
  fkey 3
  fkey 7
 REM.. then insert end markers required
 REM.. and lines to make .LOC work
 REM.. when at ">END"
  type">END"+R$+R$
  type "zzz"
  dothis
   type R$
  times 7
endproc

.LN
 cursor down
 cursor at 0
goto M1

.UP
 cursor at 0
 cursor up
goto M1

.LOC
 REM.. find start of next record
  cursor right
```

pattern, it should not be hard to amend the segment programs to suit your own needs.

Main functions

After booting the database disc with Shift+Break the program is automatically loaded. Press Shift+f9 to run it and enter the left margin width for printouts.

You can now exercise all the routine options by pressing a single letter. The most important to start is **H** for Help. The options and their actions are shown in the table. The two options S(eek) and F(ind) are similar but the difference between them is that the former looks for an existing record while F(ind) locates – more slowly – a place in alphabetic order for a new record. If Seek does not find what you want press R to Repeat the search.

You can use *wildcards* in your search. For example, a search for *>#M* will find any male, whether the subscription is paid or not.

You can buy ready-made database managers but they will cost you – if you have Wordwise Plus installed as a wordprocessor and are willing to experiment a little with what is really quite a simple programming language, you may be pleasantly surprised at the almost unlimited power it will give you to manipulate your records.

● Next month we'll look at some special-purpose programs for sorting and extracting records, selective printing of fields, analysis of data and creating an attendance register. Plus a brief look at the law's requirements for personal data kept on a computer and ways to make sure you do not lose your precious data files.

```
  find ">"
 REM..cursor to start of current record
  cursor up 9
endproc

.INS
  REM.. get new line of text
   cls
   v.10,10,10
   print "Type replacement for line ";
   print "- ""Q"" to abort"
   print N$+Q$;
   G$=glk$
  REM.. allow abort
   if G$="Q" or G$="q"then goto M1
  REM.. wipe out old line
   cursor at 0
   fkey 3
   cursor at 39
   fkey 3
   fkey 7
  REM.. insert new line
   type G$
   cursor right
goto M1

 REM.. jump to next record
.NX
 if SOT then cursor down 4
 if EOT=0 then cursor down 9
goto M1

 REM.. jump back a record
.BK
 cursor up 9
 if SOT then cursor down 4
goto M1

 REM.. cursor to first record
.HOM
 select text
 cursor top
 cursor at 0
 cursor down 4
endproc

.HELP
 cls
 vdu 10
p."        MOVING through DATA"
p."        ~~~~~~~~~~~~~~~~~~~"
p."Press""L"" to move down a LINE"
p."Press""T"" to go to TOP of record"
p."Press""U"" to go UP a line"
p."Press""N"" to move to NEXT record"
p."Press""B"" to move BACK"
p."Press""S"" to SEARCH for word(s)"
p."Press""R"" to REPEAT search"
p."Press""F"" to FIND PLACE for new
record"
p."        PRINTING A RECORD"
p."        ~~~~~~~~~~~~~~~~~"
p."Press""P"" to PRINT a name and
address"
p."        MANIPULATING DATA"
p."        ~~~~~~~~~~~~~~~~~"
p."Press""C"" to COPY record"
p."Press""D"" to DELETE record"
p."Press""A"" to ADD record"
p."Press""I"" to INSERT line change"
p."        LEAVING ROUTINE"
p."        ~~~~~~~~~~~~~~~"
p."Press""E"" TO END operation"
 print M$
 G%=get
goto M1

 REM.. finds place for new record
.FIN
 cls
 vdu 10,10,10
 print "Enter SURNAME to insert"
 pr. "(Only initial letter as Capital)"
 print Q$;
 S$=glk$
 REM.. the "seek" process
  procHOM
  cursor down 2
  repeat
    if S$<=glt$ then goto F1
   cursor down 8
  until false
 .F1
  cursor up 3
 REM.. set X%, flag to be used by .ADD
  X%=1
goto M1

 REM.. copy a record
.COP
 procLOC
 REM.. mark record to copy
  fkey 3
  cursor down 9
  cursor at 0
  fkey 3
 REM.. now use fkey to copy marked text
  fkey 9
  delete markers
  cursor at 0
goto M1

 REM.. search for text string S$
.SCH
 procHOM
 cls
 vdu 10,10,10
 print "ENTER character(s) to find"
 print "(CARE with capitals)"
 print
 print Q$;
 S$=glk$
 find S$
  if EOT then goto NOTFD
goto M1

 REM.. repeat a search for text
.REP
 cursor down 9
 find S$
  if EOT then goto NOTFD
goto M1

 REM: advise when search reaches EOT
.NOTFD
 cls
 vdu 10,10,10,7
 pr. "I couldn't find the text sought"
 print M$
 G%=get
 procHOM
goto M1

 REM.. print individual record
.PR
 procLOC
 cursor down 3
 REM.. printer on
  vdu 2
   print L$+glt$+" ";
   cursor up 2
   print glt$
   cursor down
   dothis
    G$=glt$
     if G$<>"" then print L$+G$
   times 3
   print
   print
   REM.. printer off
   vdu 3
   cursor down 2
goto M1

 REM: create left margin string: L$
.LM
 L$=""
 cls
 vdu 10,10,10
 print "Enter LEFT MARGIN width"
 print "Press E and SHIFT-f9 to reset"
 print
 print Q$;
 O$=glk$
  if VAL0$=0 then endproc
 dothis
  L$=L$+" "
 times val0$
 REM.. enable carriage retns on printer
  oscli"FX6"
endproc

 REM.. prompts for and accepts data
 REM.. for each record field (line)
.ADD
 cls
 print N$+N$+"Code(s)"+Q$;
  A$=">"+glk$+R$
 print N$+"Date of Birth"
 pr. "(If a JUNIOR use form YR.MO.DA)"
 print "(If an ADULT enter 99)"
 print Q$;
  B$=glk$+R$
 print N$+"Surname"+Q$;
 REM.. flag X% uses surname from .FIN
  if X%=1 then C$=S$+R$
  if X%=1 then print C$
  if X%=0 then C$=glk$+R$
 print N$+"Title and forename"+Q$;
  D$=glk$+R$
 print N$+"Address Line 1"+Q$;
  E$=glk$+R$
 print N$+"Address Line 2"+Q$;
  G$=glk$+R$
 print N$+"TOWN"+Q$;
  H$=glk$+R$
 print N$+"Phone, Notes"+Q$;
  J$=glk$+R$
 procLOC
 type A$+B$+C$+D$+E$+G$+H$+J$+R$
 REM.. cancel flag X%
  X%=0
goto M1

.DEL
 cls
 vdu 10,10,10,7
 print "DELETES RECORD - ARE YOU SURE";
 print " Y/N?"
 print
 print Q$;
 Z$=gck$
  if Z$="y" then Z$="Y"
  if Z$<>"Y" then goto M1
 procLOC
 REM.. first mark entire record
  cursor up
  fkey 3
  cursor down 9
  fkey 3
 REM.. fkey deletes marked text
  fkey 7
  cursor down
goto M1

.END
 vdu 7
 display
```

HOLED OUT!!

The original two contrasting 18 hole courses. Comes complete with an easy to follow 16 page manual.

Tape £10.95 *SAVE £2*
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All three save even more. See order form

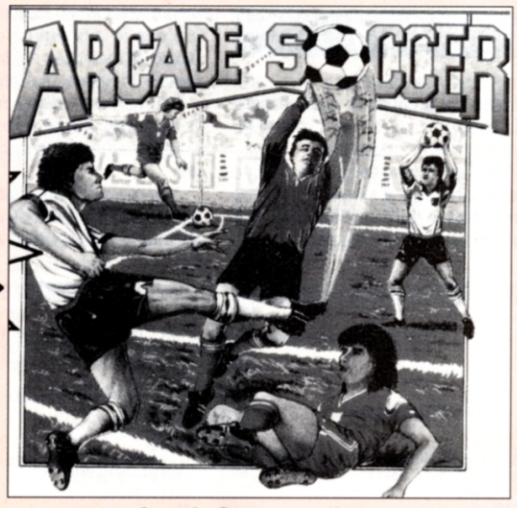
U.I.M is a massive 3D arcade adventure set in the future

You must travel the oceans, trading in commodities, shares and currency. There are over 250 missions to complete before you will find your goal – the U.I.M. Your craft is a highly manoeuvrable (and expandable) futuristic submarine. The quest for the U.I.M. will be long and involved, the dangers intense, but the reward priceless!

"Will I keep playing it the way I've played Elite for years? And the answer is YES. Graphics 10, Playability 10, Value for money 10" – review in *The Micro User.*

U.I.M. is disc only and will run on BBC B or B+ with 16K of sideways RAM, BBC Master series.

5.25" disc £17.95 *SAVE £2*
Master Compact 3.5" disc £19.95 *SAVE £2*
Archimedes disc £27.95 *SAVE £2*



Arcade Soccer really is football action at its very best

"The game is very playable and you do get a feeling of involvement as you knock the ball into the corner of the net straight past the diving goalie. It's definitely one to play again, and if you've enough friends it could make for a good day of enjoyment – and not a lot of games can do that. Value for money – 10 out of 10" – review of *The Micro User.*

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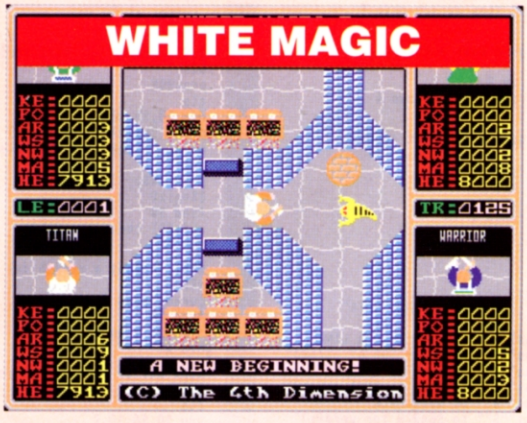
5.25" disc £10.95 *SAVE £2*
3.5" disc £11.95 *SAVE £2*
Archimedes disc £17.95 *SAVE £2*

All available on the Archimedes



WHITE MAGIC 1

White Magic is a arcade adventure in which you control four varied adventures. You can mix between all four characters at will and use their much needed special abilities. It features 32 massive action-packed levels.

A fast-action game which requires fierce hand-to-hand combat and frantic weapon fire.

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3.5" disc £11.95 *SAVE £2*
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WHITE MAGIC 2

This includes 32 new and highly dangerous levels plus a complete level designer.

The level designer is easy to use. With it you can alter or design levels from scratch.

"The graphics are superb ...An absolute winner" – *Electron User Golden Game.*

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3.5" disc £11.95 *SAVE £2*
Archimedes disc £17.95 *SAVE £2*

Place your order today, using the form on Page 127

More dates with View

£10 Prize letter

PETER Frost's letter Make a date and keep it *in the July 1990 issue of* The Micro User, *came at an opportune time as my wife had just started using the View word processor for correspondence.*

Although useful as it stands, the program allowed any leading zero in the date to be printed and only the first three characters in the month name are printed. This is to be expected because the information is simply extracted from the pseudo-variable TIME$ and used without modification. But it looks a trifle messy in business correspondence.

The following short Basic program called Setup will rectify the above problems, at the same time retaining the other features such as changing the foreground and background colours and loading a View ruler cursor which appeared in an earlier issue.

The program finally runs an appropriate printer driver and loads a View template file called tmplate, *which is then entered with the cursor placed in readiness for typing and the date in full.*

*Note that the character @ is used instead of "D" as the dummy date in the template file. This allows both upper and lower case characters to be substituted into the date when *FX138 is executed.*

Owners of double-sided disc drives can put these three files – Setup, template *and* booter *– out of sight on drive 2, leaving drive zero containing only document files, plus a simple !boot file which executes the Setup file.* – **H. L. Smith, Ipswich.**

Boot file

```
*BASIC
CHAIN  :2.SETUP
```

SETUP file

```
  10REM Program  Setup
  20REM by H.L.Smith
  30REM (c) The Micro User
  40:
  50*SHADOW
  60MODE 0
  70*FX15,1
  80VDU19,0,4;0;
  90VDU19,1,6;0;
 100PROCget_date
 110*RUN :2.M.Ruler
 120*EXEC :2.booter
 130END
 140:
 150DEF PROCget_date
 160T$=TIME$
 170IFMID$(T$,5,1)= 0 THEN
num$=MID$(T$,6,1)ELSEnum$=M
ID$(T$,5,2)
 180month$=MID$(T$,8,3)
 190inful$=FNfull_month(mo
nth$)
 200year$=MID$(T$,12,4)
 210date$=num$+   +inful$+
  +year$
 220OSCLI( KEY10 C/@/ +dat
e$+ |M + S ^Z |M )
 230ENDPROC
 240:
 250DEF FNfull_month(m$)
 260IFm$= Jan  = January
 270IFm$= Feb  = February
 280IFm$= Mar  = March
 290IFm$= Apr  = April
 300IFm$= May  = May
 310IFm$= Jun  = June
 320IFm$= Jul  = July
 330IFm$= Aug  = August
 340IFm$= Sep  = September
 350IFm$= Oct  = October
 360IFm$= Nov  = November
 370= December
```

Booter file

```
*WORD
PRINTER :2.M.KXP1081
*FX202,48
LOAD :2.tmplate
*FX138,0,138
```

Template File

```
..>.....................
.....................*.....
.............<
LS0
LM8
PL70
TM2
HM2
FM2
BM5
                My Street
                Anytown
                County
                Post Code

                @

Dear
```

Win a tenner

WANT to write to This page? The addess is: Letters, The Micro User, Europa House, Adlington Park, Macclesfield, SK10 4NP.

Writers of the most interesting letters receive a £10 prize.

Cheap printing

I WOULD like to know if it is possible to connect an Amstrad PCW8256 printer to the BBC Micro and if so, what alterations or what hardware or software are needed, bearing in mind that I would still like to be able to use it on a PCW8256.

Also do you know of anyone or anywhere I can get hold of a manual for the QFS 2.00 that covers the double density features, because the manual I received with my disc drive only described a single density disc interface, and the fitting instructions only has a couple of pages on how to format in double density.

*I have also discovered the existence of the command *OPT 5,0 and *OPT 5,1 but have no clues as to what they do except when *OPT 5,1 is used, loading several things tends to fail and a double density disc registers as a blank single density disc when using *CAT.* – **Tim Moore, Dawlish, Devon.**

● Like many tasks it's not impossible to link a PCW8256 to a BBC Micro but it wouldn't be easy. The problem is more than just a question of hardware, the PCW printer contains only the print mechanism as it is controlled by the 8256 directly, it has no chips of its own. To connect it to a BBC Micro you'd have to write rom software to drive it.

Demanding games

HAVING bought The Micro User *since January this year and also* Electron User *for the last few years, I think that both magazines offer unparalled service to owners of Acorn machines. It's nice to see that now* Electron User *has joined* The Micro User *you haven't put the price up.*

I would like to reinforce Peter Scott's comment from the July issue when he said "I feel that conversions are vital to keep the BBC Micro visible in the software market.

High street stores are much more likely to stock a game with a recognisable name. So if you want versions of games like Operation Wolf, Robocop and Batman from Ocean or Strider, Black Tiger and E-Motion from U.S. Gold why not write to them?"

This does not apply just to ➤

Beeb owners but to Elk and Arc owners too. The addresses are: Ocean, 6 Central Street, Manchester M25 NS and U.S. Gold, Units 2/3 Holdford Way, Holdford, Birmingham. – **Simon Tarry, The Hague, Netherlands.**

Sounds good

MAY I first congratulate you on your excellent magazine – I have bought it since the first issue, and still find it as interesting and useful as it was in 1983.

Since then, I have upgraded to an Archimedes 420/1. And was delighted to find the Music Box article on defining new sound modules using the KeySound application in the August issue.

This was the first Archimedes program I felt compelled to type in, so I spent an evening typing in the checksum generator program from a previous magazine. I was delighted to find that this worked, so I eagerly started to type in the KeySound program.

However, on reaching line 570, I was unable to type in the line so as to agree with the checksums, even counting spaces, and using WIDTH 30 did not work. Have I incorrectly entered the Checksums program so it cannot evaluate spaces, or is there a printing error?

The same error occurs in line 600 and the *KEY command ignores spaces in that part of the comand anyway. I am unable to proceed with the typing due to the cumulative nature of the checksums, so could you please tell me how to enter the lines? – **Ben Avison, Middlesbrough, Cleveland.**

● There are errors in those lines – they should be:

```
570 *KEY 0 |!"
600 *KEY 13 |!!
```

In fact it's only the last digit of the checksum that is cumulative, the group of four applies just one line. So it is possible to continue, although you miss the benefits of being able to narrow down errors in any part of the listing. Remember the subscription disc saves on typing – and you get all the PD goodies as well – free.

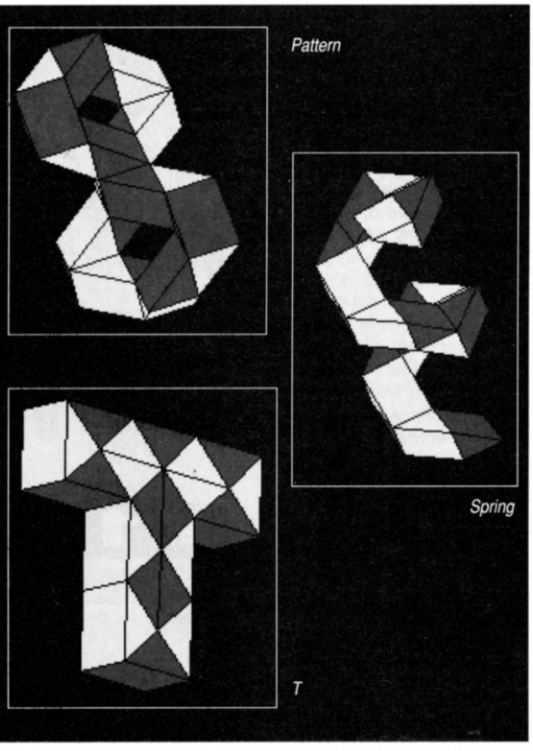
Snakes alive

WE typed in the Snake program from the June 1990 issue and created some procedures to draw an interesting pattern, a spring and a capital T:

Shape	Command
Pattern	LRDRRDRLDR
	RDLRDRRDRL
	DRR
Spring	RRDRRDRRDR
	RDRRDRRDRR
	DRR
T	DDDUDUUDDD
	DUUDUDDDU

– **Paul Matthew and Scott Graham, Stroud, Glos.**

● Have any other readers created interesting shapes with Snake?



Chess Master

I OFTEN use several discs at one time and am inconvenienced by the amount of time spent looking in !Sprite files in directories. I am reluctant to delete these sprite files and was wondering if there is any command that will disable it when switched on?

Are there any decent chess programs for the Archimedes? I have not seen any and I think this is a shame as the Archimedes has an amazing sound and graphics capability and is certainly capable of producing animated battle sequences between two pieces like those I have seen on the Nimbus.

Chess is one of the great games of all time and I am sure that some software houses out there would sell many copies if they released a version. Almost all the other home micros have some form of Chess program available so why should Archimedes owners miss out. – **Jonathan B. Aldred, Wirral, Merseyside.**

● Colossus Chess X will work on the PC Emulator but, unless you have an A540, it is rather slow. However David Pilling has produced a multi-tasking chess program which – we understand – plays a reasonable game.

There's no way of stopping the Filer from looking at the sprite files. If you really want to speed things up you could rename rather than delete them – however you may find some !boot files will generate *File not found* errors.

Alternatively you could reorganise your discs with !System and !Fonts at the top level then a directory for applications, which is further subdivided into, say, Text, Graphics, Calculations and Utilities. In this way you only need open those directories that you need.

Printing by jet

IN the July issue, Eric Keeley asks about italics and bit-mapped graphics on the Olivetti JP101 jet printer. Although the JP101 has 8 different national alphabets, the handbook gives no mention of italic capabilities. Double height and double width characters are of the normal form.

Bit-mapped graphics involve a command block followed by a data block. The command block that follows is for a graphic output commencing 100 dots width from the left paper edge, covering 32 bytes horizontally and 4 vertically, with a vertical multiple of 2:

```
*FX3,10
VDU27,ASC"G",100,ASC";",32,
ASC";",4,ASC";",ASC"2"
VDU 27,ASC"Z"
*FX3,4
```

The two FX commands are used to send the data to the printer only, it removes the need to send a 1 before every code.

Limits are 1 to 255 for left margin, 1 to 110 horizontal bytes, 1 to 255 vertical bytes, 1 to 9 (default 2) for vertical multiplier.

The data block is in the form of bytes each corresponding to the eight dots arranged horizontally for the width of the output, then continuing on the next line.

A so-called zoom effect gives magnification times 2. This is performed by VDU27,47 immediately before the graphic command block. Graphic printing from Basic is very slow, and the handbook advises the use of machine

code. I hope this information may be of some use. – H. L. Clarke, Whitton, Middx.

Shadow on the side

I HAVE a BBC B and am thinking of buying the game U.I.M. but apparently I need shadow or sideways ram – but what are they? Instead of using those could I use the extra ram board mentioned in your July issue. – **L. Prout, London.**

● In your micro the main memory is used to store programs, data and, unfortunately, the screen display as well – the better the screen mode the more memory it takes up. Shadow ram provides extra memory for the screen only and so the good modes don't use up valuable program space.

Sideways ram is more complicated: There is a 16k area of memory that can have up to 16 *pages*, all in parallel, although only one can be in use at a time. This space is occupied by Basic, the DFS and any other roms you have plugged in.

In the standard BBC B only four sockets out of the possible 16 are provided and many companies provide boards to expand the machine to the full complement. Each of these sockets can contain either a program in a rom, or ram.

The 1MHz board design that was featured recently would not be suitable as UIM isn't expecting it.

Friendly comms

I OWN a BBC A3000, with two megabytes of ram. I have recently been following the P.D. software feature and since I am a subscriber to The Micro User *received the !Translator program on the July disc.*

My friend has an Amiga, and I would like to know how to port files across to my A3000. I have the serial chips fitted, my friend has some communication software and we have the connectors and the lead. Do I need a comm's package or can the A3000 receive the files on its own, and if so how. If I do need to get a comm's package can you recommned one, preferably cheap.

Can I use the same procedure for porting over sound tracker files from the Amiga? I have the !STracker program from the June disc. – **P.Walker, Gillingham, Kent.**

● The simplest method is direct connect using comms software, there's almost certainly some PD comms software although we haven't seen any yet. Minerva's DeskTop Office contains good comms package but they don't sell it seperately.

At present it's possible to read ST discs using PC disc-reading utilities as the formats are very similar, but AmigaDos discs cannot be read direct – until someone comes up with a utility.

Mastering 8 bit DTP

MY PROBLEM is not a technical one but maybe you can point me in the right direction. I recent bought my 13-year-old a Master 128 with single disc drive and Panasonic KX-P1081 printer.

We are now looking for applications other than games playing and word processing but are to say the least confused by the plethora of advertising.

We are looking for a reasonable DTP drawing package which we could use for presentation of topics and projects – are there any which we can use on the Master? Some seem to be unable to run all the functions.

I am sorry if these questions appear very basic to you but for a non-computer person like myself confusion reigns. Apart from reading magazines there appears no simple way of getting the most out of our computer and that could take years and many costly mistakes. Any help that you could give us will be greatly appreciated. – **I. S. Wilson, Rayleigh, Essex.**

● The most sophisticated DTP package for the Master is undoubtedly Wapping Editor from Watford Electronics. It has most of the facilities you could want and is fairly easy to use.

Unfathomable errors

AS a beginner on the BBC A3000 I'm having problems with error messages which I can't understand, for example:

- *No run action specified for this file type*
- *System resources cannot be found*
- *Code runs too low*
- *Execution address not within code*
- *Filecore in use*
- *Disc error 10 at :T/00000400 at line 90*
- *File 'Suits3' not found at line 4370*
- *Sprite doesn't exist*
- *No room to get sprite at line 470*

If you can answer these in a simple way you will make me a happy old man. – **Jesse H. Luxton, Fairlight Cove, Hastings.**

● Well, some things are easier to explain than others – we'll do our best:

Because files can be of different types it's possible to tell Risc OS what to do with them when they are double-clicked. For example Basic programs are given to Basic to run, Sprite files are either shown on the screen or loaded into !Paint, and so on. But if Risc OS hasn't been told what to do it gives the message *No run action specified for this file type.*

On the Apps1 disc there's a directory called !System, and in there are many useful routines that are needed by other programs like !Paint, !Draw and !Sparkplug on our monthly disc – these routines are the System Resources. The Risc OS keeps track of where things are but it needs to have been shown !System before it knows where the System Resources are.

Practically speaking this means you have to stick the Apps1 disc into the drive and click the icon so that the directory comes up before running other programs.

Code runs too low and *Execution address not within code* usually mean you're trying to run a machine code program for the BBC Micro on the 32 bit machine – it won't work.

There is a bug in the Filer which causes the *Filecore in use* error after it's seen about 10 different discs, there is a fix for it but it's simpler just to save regularly to disc and reboot when it happens. Hard disc owners will not get this often.

The disc error means there's something wrong with the disc. The remaining errors are dependent on individual programs and indicate poor programming rather than your error.

ALL programs printed in this magazine are exact reproduction of listings taken from running programs which have been thoroughly tested.

However, on the rare occasions when mistakes occur corrections are published as a matter of urgency. Should you encounter error messages when you type in a program, they will almost certainly be the result of your own typing mistakes.

Unfortunately we cannot answer personal programming queries concerning these mistakes. Of course letters about suggested errors will be investigated without delay, but any replies found necessary will only appear in the letters pages.

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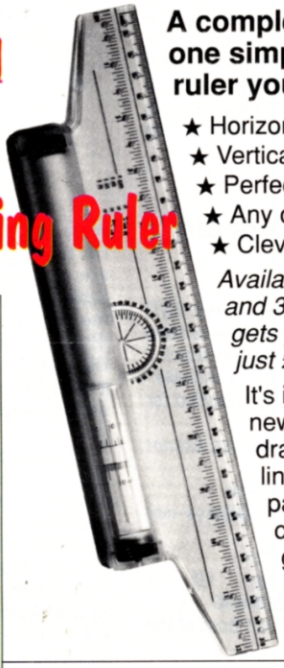

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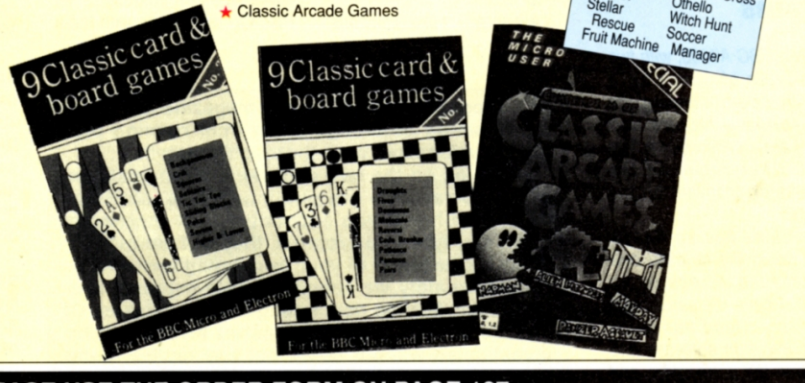

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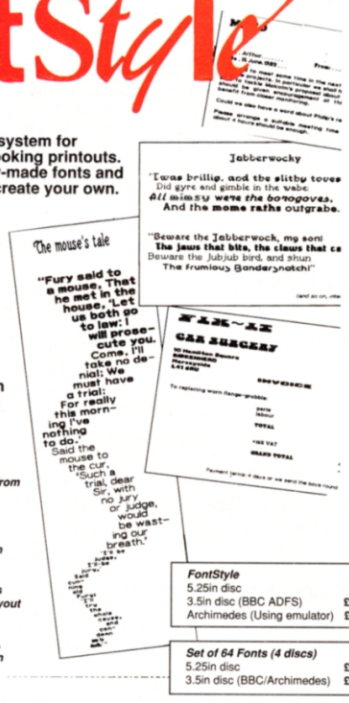

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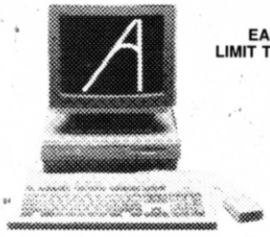

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Plan B		
Plan B2		
Styx		
Uranians		
Warehouse		
Wet Zone		

M = MASTER COMPATIBLE

GRAB A BARGAIN!!

Come and meet us in person at this terrific Xmas Micro show. See the ***NEW RELEASES*** *and try them out for yourself.*

COMPUTER SHOPPER SHOW

Stand J8, The Exhibition Hall & Thames Suite, Wembley, Empire Way, Wembley, London

6th-9th December 1990

STOP PRESS...

LATEST NEWS & REVIEWS

THE WIMP GAME

A brilliant pointer driven graphic adventure celebrating over 10 years of Acorn Home Computers. This revolutionary multi-tasking game is unlike any other game produced for the Arc and even allows you to run other programs whilst you play it. Work your way through the different locations using your pointer to try out the many objects you will encounter and your magnifying glass to examine them.

CHOCKS AWAY

This 1 or 2 player flight simulator places you in command of a souped-up Tiger Moth bi-plane. There are 20 demanding missions with aircraft carriers, patrol boats, bombers, land guns, fighters and enumerous other opponents in solid 3D graphics. Also featured are various practice options and 3 huge maps. The ingenious split screen option allows 2 players to fight each other and you can record whole flights and play them back later. Supplied on 2 discs with full instruction manual.

SUPERPOOL

A 3 dimensional Pool simulation designed exclusively for A3000 and Archimedes computers. Superpool allows you to play tournaments, challenges, trickshots, replay your last shot and even create and edit your own tables. You will be to view the table from any angle or distance and move around it even while the balls are moving. There are options to play against computer players or a friend, make swerve shots, incredible masse shots, play 9 ball or 15 ball pool and all the rules are fully implemented.

NEVRYON

An arcade quality sideways scrolling shoot'em up featuring the best graphics, sound and music yet seen or heard on the Arc. 4 very different missions will tax your skills to the limit and there are 6 pieces of excellent stereo music to set the scene. Over 1.5 megs of 256 colour graphics are scrolled at 25 frames per second with up to 60 objects on screen and 6 levels of true parallax scrolling. There's an amazing array of weaponry to collect to cause maximum devastation. A superb game.

BREAK 147

A full 3D snooker implementation with superb solid graphics and brilliant digitised sound effects. Incredibly realistic interaction between the balls allows swerve, stun, backspin etc. You can view the table from any angle even as the balls are moving. All the rules of snooker are implemented and you can play matches, set up tricks shots or just practice. Play against friends or the computer and save whole frames to replay later.

THE REAL McCOY

A top quality 4 game compilation package featuring UIM, Arcade Soccer, White Magic and Quazer. Individually the games would cost £81.80 making The Real McCoy possibly the best value on the market.

DROP SHIP

Drop Ship features 15 levels of super smooth (50 frames per second) arcade action. Your ship, which is plotted to an accuracy of 0.0001 of a pixel, can collect credits for extra weaponry, anti-gravity controllers and much more. The gameplay is stunning and is packed with features to keep you hooked. Drop Ship is supplied on 2 discs with instruction manual.

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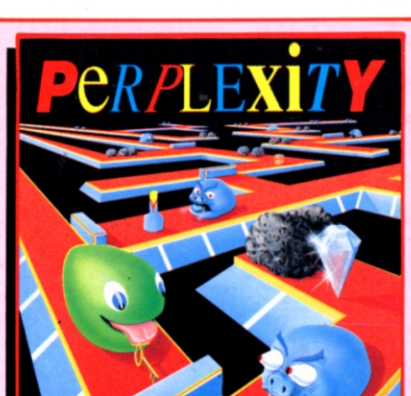
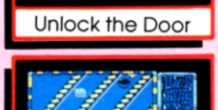
THREE GREAT NEW TITLES FROM SUPERIOR SOFTWARE



Unlock the Door


Beware the Monster

PERPLEXITY

3-Dimensional Strategy Game with Brilliant Graphics

PERPLEXITY consists of 16 increasingly difficult levels, each a puzzling maze with one of four different 3D background themes. Collect the diamonds by pushing together the boulders scattered about the maze and push the keys to the correct doors to open them.

But watch out for the monsters who will chase you around the maze. And watch out also for the 'mystery boulders', which may give you a bonus score or a magic potion, but may also reverse some or all of the movement controls...then you've really got problems!

On-screen information includes a constantly up-dating scanner/map, which allows you to plan your route, a score-line and timer/status icons. Passwords allow you to skip completed levels.

PERPLEXITY combines the best puzzling features of REPTON games with superb 3D graphics, to give a highly addictive and visually brilliant game. Are you ready to face the challenge?

BBC Micro/Master & Electron

HOSTAGES

Realistic Graphics & Gameplay...Superb Sound Effects & Tunes

An urgent phone call from the National Security Minister....an Embassy has been overrun by terrorists. As Head of the Terrorist Combat Squad you are in control of all operations.

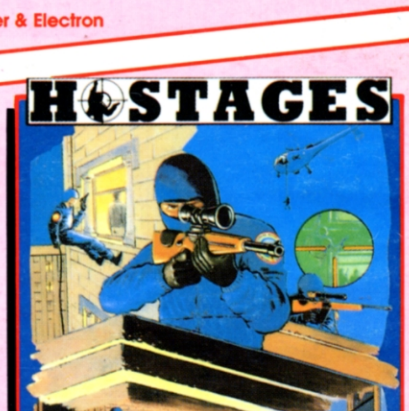
First, you must place your crack marksmen in nearby buildings, avoiding infrared lights and the terrorists' deadly aim. Then, after descending by rope, and protected by your marksmen, enter the Embassy through the windows and begin your search in silence. But beware, each door, each room, could be a death trap!

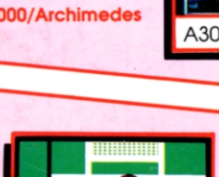
You must rescue the hostages, without any loss of life, and this will depend on the cohesion and co-ordination of your team.
NOW IT'S YOUR MOVE ! KEYBOARD OR JOYSTICK/MOUSE CONTROL.

BBC Micro/Master, Electron & A3000/Archimedes

BBC Micro/Master

A3000/Archimedes




Superior Soccer

Star Port

PLAY IT AGAIN SAM 14

A New Action-Packed Four-Game Compilation

PREDATOR

Nothing like it has ever been seen before! You've heard about the Schwarzenegger film PREDATOR...now you can play the leading role. Fight your way through the South American jungle, but, beware the mysterious alien...

"A fun game having a lot of the feel of a Schwarzenegger film"...Micro User

SUPERIOR SOCCER

A fast action arcade game, with realistic graphics, or a challenging football management game...or, for the ultimate in football excitement and realism, you can play a combination of both!

"Puts you in the role of football player/manager, combining on-the-field action with strategic planning just like the real thing!"...BBC Acorn User

BALLISTIX

It's a whole new ball game! The fastest, wackiest, toughest computer game yet to appear. Play against a friend or the computer...60 different screens.

"Ballistix is original, fun and very addictive. Each new level is a challenge which brings a new court layout with several surprises"
...Electron User

STAR PORT

A brand-new arcade-adventure with 60 action-packed screens, written by the author of QUEST and CAMELOT. Rescue the medical supplies from the strange triangular space station...but only if you can solve the increasingly difficult letter-puzzles on each level.

BBC Micro/Master & Electron

BBC Micro Cassette.....£9.95 each BBC Micro 5¼" Disc.....£11.95 each

(Compatible with the BBC B, B+ and Master 128 computers.)

BBC Master Compact 3½" Disc.....£14.95 each Electron Cassette.....£9.95 each

HOSTAGES A3000/Archimedes 3½" Disc.....£19.95 each

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